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THE UNERUPTED THIRD MOLAR FROM AN ORTHODONTIC POINT OF VIEW

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THE unerupted third molar has long been a controversial subject with the orthodontists as well as with the oral surgeons. Such well-known pioneer orthodontists as Hellman, Young and Kelsey have given much of their time to the study of this problem. The orthodontist has been concerned with development of the jaws and the effect of functional forces toward accommodating the third molar, while the oral surgeon's problem has been primarily surgical in the study of the successful removal of this tooth. For the surgeon's success and skill in accomplishing this, the orthodontist is deeply grateful, as it aids in ultimately solving the orthodontic problem here indicated.

In considering this subject, I should like to first think of it at a time when the roentgenogram was little or seldom used and the technic of removing impacted third molars had not been developed as it has been in recent years. The added knowledge of growth and development enhances our understanding of the problem, and last, but by no means least, the results of research on occlusion and correlated subjects add to the progressive enlightening picture.

The earlier concept of orthodontic practice seemed to be that twenty-eight permanent teeth were to be placed in occlusion without much consideration of the four remaining third molars. Then something happened. What accounted for some of the apparent failures in treatment, such as crowding of the anterior teeth, open-bite conditions and other occlusal disturbances? Soon the more observing began to suspect the third molar. Without the roentgenogram and the modern technic for removal of the third molars, several compromise methods were resorted to. In some cases, the maxillary or both the maxillary and mandibular second molars were extracted to make room for the third molars. The premolars were extracted in some cases, for the same reason. This, many times, proved unsatisfactory and often failed to give the desired results,

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even resulting in confused opinions among leading orthodontists.

The ideal of the orthodontist in recent years has been to place the thirty-two teeth in normal occlusion. The patient may be well pleased with the results obtained without the third molars in normal position. However, the orthodontist never experiences quite the same satisfaction that he does when he succeeds in supplementing Nature's efforts with artificial stimulation of the supporting structures of the teeth sufficient to provide space for all of these teeth. Whether or not this can be accomplished, the third molars should, in most instances, be retained, even though apparently impacted, until the maximum growth of the face, denture and jaws has been attained, which should be between the sixteenth and the eighteenth year. This will especially assist in the vertical development in the premolar and molar regions, and if the third molars are finally brought into normal position, they can be considered essential in maintaining this vertical development and in maintenance of the integrity of the arches in functional occlusion in adult life. In spite of this idealism, it is my belief that in less than 10 per cent of cases are we able to attain this ideal.

With the unnatural preparation of food, in this so-called modern civilization, the function of mastication has been so interfered with that, in a large percentage of cases, the development of the jaws is far below that which was intended by nature. Not all cases exhibit malocclusion in the earlier stages of development: many are in alinement and present a normal relation of the arches after the eruption of the second permanent molars. Malocclusion, then, may develop early in life or after the first twenty-eight teeth are in normal occlusion.

In some persons, the development of the maxillae and mandible will continue until the upper and lower third molars can erupt in normal occlusion. In more cases, they will not do so, and, at this point, provided the patient has reached maturity and the arches are of an adult pattern, these molars should be extracted. If not completely submerged, they will partially emerge from the alveolar process, where they will continue to be overlaid by the soft tissues, a pocket forming which the secretions of the mouth can readily enter. The result is a chronic infection or pain and swelling in the third molar region, and often an acute infection. An impressive clinical picture of this condition was observed in an army camp, where many men reported daily or weekly for treatment of third-molar complications. The majority of these men were at the age when the third molar was making its appearance. The complications were of almost every form, sometimes suggesting a normal eruption except for insufficient room, usually accompanied by crowding of the anterior teeth. If immediate extraction was contraindicated, the patient was given a periodic examination or treatment until satisfactory eruption of the third molar or extraction of the tooth, before being dismissed.

Fig. 1.—Normal formation for accommodation of third molar.

In order to distinguish the abnormal from the normal, let us consider the normal formation for the accommodation of the third molar, with the accompanying well-known illustration. (Fig. 1.)

In his "Variation in the Form of the Jaws," Wallace quotes Hunter's description of the growth of the jaws:

"The jaw still increases in all points till twelve months after birth when the bodies of the anterior part of the arches of both jaws never becomes a section of a larger circle, whence the lower part of a child's face is flatter, or not so projecting forward as in the adult.

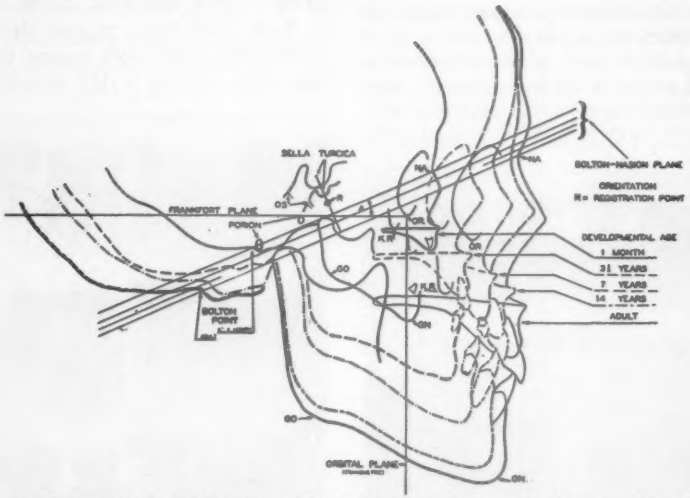

Fig. 2.—Developmental growth of face. (From Bolton study records of 3,500 white children.)

Fig. 3.—Case due to impaction of third molars, in girl aged 17.

all the six teeth are pretty well formed, but it never after increases in length between the symphysis and the sixth tooth; and from this time, too, the alveolar process which makes

"After this time the jaws lengthen only their posterior ends, so that the sixth tooth, which was under the coronoid process in the lower jaw and in the tubercle of the upper

jaw of the fetus, is at least—viz.; in the eighth or ninth year—placed between these parts, and then the seventh tooth appears in the place which the sixth tooth occupied with respect to the coronoid process and tubercle, and about the twelfth or fourteenth year the eighth tooth is situated where the seventh tooth was placed. At the age of 18 or 20 the eighth tooth is found between the coronoid process in the lower jaw and under or somewhat before the tubercle in the upper jaw, which tubercle is no more than a suc-

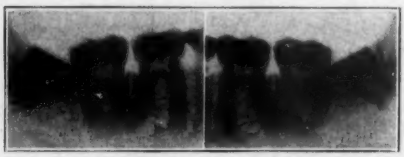

Fig. 4.—Case shown in Figure 3.

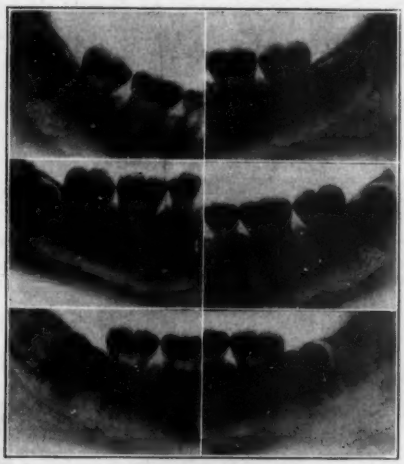

Fig. 5.—Class II, Division 1 case in patient aged 14. Above, films taken in 1934. Center, films taken in 1937. Below, films taken in January 1940.

cession of sockets for the teeth till they are completely formed."

Figure 2 is taken from the Dewey-Anderson "Practical Orthodontia, from a chapter by B. Holly Broadbent. The reproduction, from the Bolton Study records of 3,500 white children, pictures the normal development of the face, showing the growth of the maxillae and mandible for the accommodation of all the teeth. The posterior development of the mandible is to be noted particularly.

In primitive man, the third molar was rarely, if ever, impacted. L. M. Waugh, of New York City, proved this to his satisfaction in his work among the Eskimos, who live on a diet requiring vig-

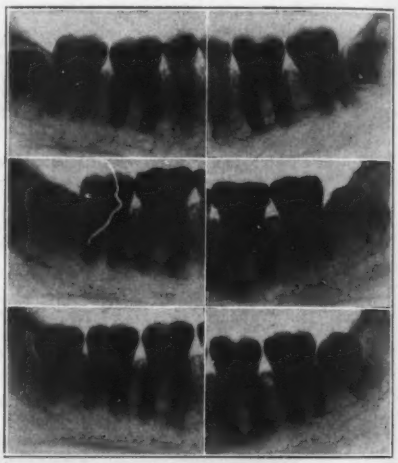

Fig. 6.—Class I case in patient aged 13. Above, films taken in April 1935. Center, films taken in November 1937. Below, films taken in July 1939.

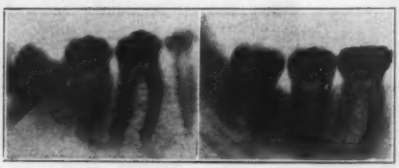

Fig. 7.—Subdivision of Class I case in patient aged 20. Left, appearance when treatment was started. Right, result of treatment, December 1939.

orous mastication. It seems evident that lack of growth of the jaws is due to the absence of function necessary to bring about normal growth. Eruption of the third molar occurs, too, at a time when the rate of growth of the maxillae and mandible is lessening and the bal-

ance of forces has become more or less established, so that the resistance offered to the erupting third molar is frequently too great to be overcome by the developmental and eruptive stimulus of the tooth.

The orthodontist is primarily concerned with occlusion, and the consensus of opinion of the majority of orthodontists, based mostly on clinical observations, is that the impacted third molar is detrimental to the maintenance of occlusion. Occlusal disturbances occur, however, when the third molars have been extracted or are congenitally missing. Anomalies of the upper lateral incisors

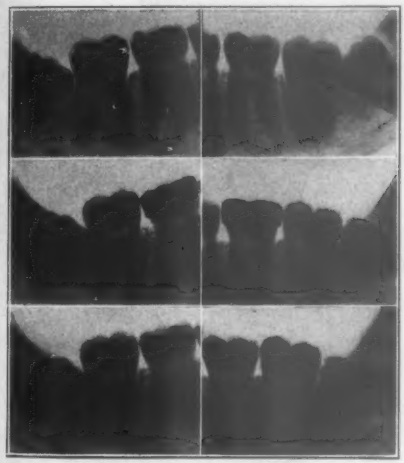

Fig. 8.—Class I case in patient aged 16. Above, condition when treatment was started. Center, films taken in December 1938. Below, films taken in June 1939.

and lack of bone development in the anterior portion of the maxillae and mandible, probably accompanied by an underlying nutritional problem and habits, are among the other factors not to be overlooked in diagnosis. There seems to be no doubt, however, that the impacted third molar jeopardizes the work accomplished by the orthodontist as well as the occlusion which has been established by nature. This tooth is often considered a menace to the general health of the patient, as well as to the adjoining teeth and surrounding structures. With the skilled technic which has been developed by the oral surgeon, the orthodontist should have no hesitancy in advising the removal of third molars when indicated rather than, as a compromise, extracting some of the other teeth.

Orthodontic cases cannot be dismissed as completed until the third molars have

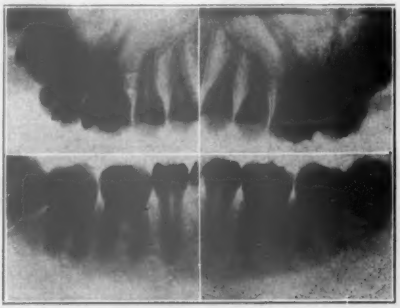

Fig. 9.—Class II, Division 1 case in patient aged 18 (taken in June 1934).

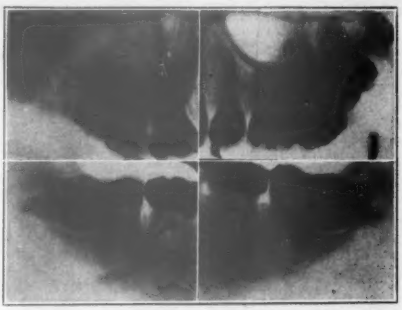

Fig. 10.—Class II, Division 1 case (Fig. 9) (taken in December 1938).

erupted in position or have been extracted. All patients, in any practice, whether treated for malocclusion or not, should be roentgenographed annually after about 16 years of age as an aid in diagnosis, for the prevention of malocclusion or occlusal disturbances in later adult life. I shall later illustrate the fact that the position of the third molar in

the early stages of development does not necessarily mean that the tooth is impacted, but a series of roentgenograms will show the process of normal or abnormal development or eruption.

Figure 3 and 4 illustrate a typical case in which there was a disturbance due to the presence of impacted third molars in a girl aged 17. This case had been under observation and periodic treatment since 1931. The roentgenograms shown here were taken in April 1938, when the patient was advised to have the third molars removed. The angulation of the second molars in both the models and the roentgenograms and the crowding of the lower anterior teeth are to be noted. The four third molars were removed, a short period of treatment was carried out for realinement of the lower anterior teeth and retention was successful.

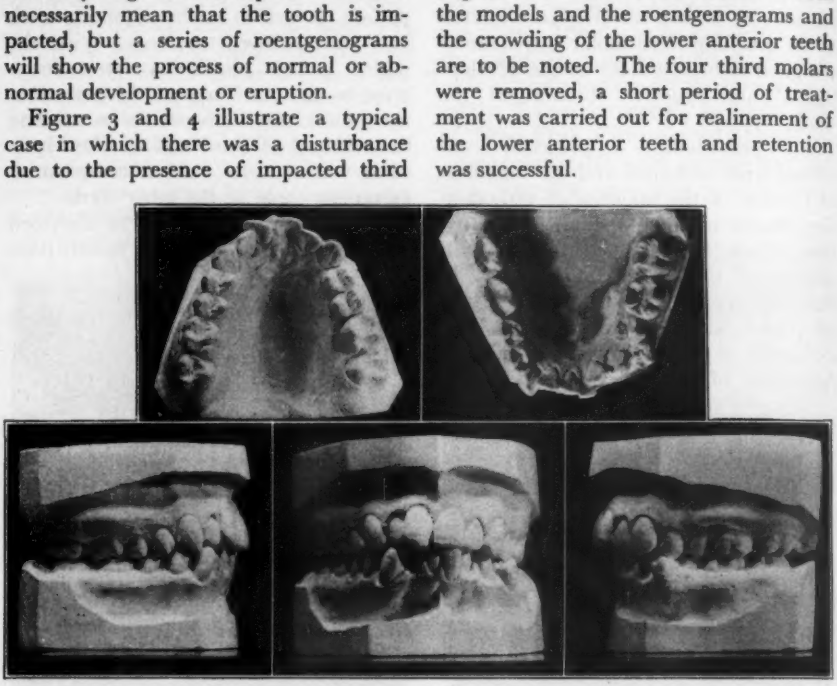

Fig. 11.—Class I case in patient aged 18.

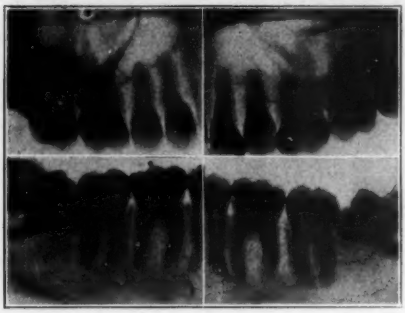

Fig. 12.—Class I case (Fig. 11).

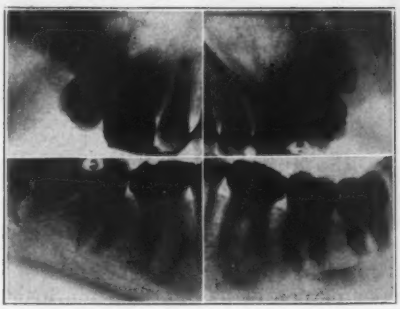

Fig. 13.—Class I case in patient aged 16, at conclusion of treatment.

Figure 5 shows a Class II, Division 1 case in a patient aged 14. Third molar roentgenograms were taken at the beginning of orthodontic treatment, in 1928. Every effort was made toward develop-

ment to accommodate the third molars, as it was thought that they would greatly aid in promoting and retaining vertical development in the premolar and molar regions. The first third molar roentgenograms were taken in 1934; the second in 1937, and the last in January 1940, when the patient was advised, at the age of 21, to have all third molars removed because they had performed their purpose in assisting jaw development and it was evident that they were beginning to cause malocclusion of the anterior teeth.

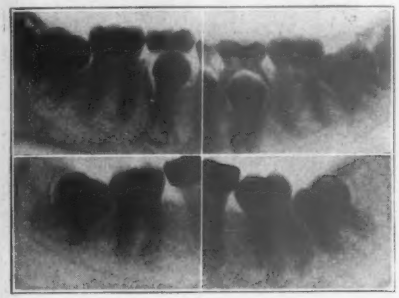

Fig. 14.—Class I case in patient aged 16 at conclusion of treatment (view below, December 1939). The pictures above were taken in 1934.

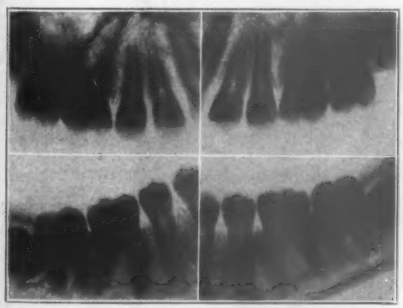

Fig. 15.—Class II, Division 1 case in patient aged 13.

Figure 6 shows a Class I case in a patient aged 13. The roentgenograms above were taken when treatment was started in April 1935. Those in the center were taken in November 1937, and those below in July 1939. This case shows quite a good progressive development, but there is still some question as to the advisability of retaining the third molars, particularly on the right side.

Figure 7 shows a subdivision of Class I case on the left side in a patient aged 20. The left film was taken when treatment was started, in January 1936; the right in December 1939. The result is what we hope for in the treatment of these cases, but seldom realize.

Figure 8 shows a Class I case in a patient aged 16. Treatment was started in June 1937. The center picture was taken in December 1938; the one below in June 1939. Just the opposite to what happened in the case shown in Figure 7 occurred in this case, although similarly treated at an earlier age. What will happen in growth and development can-

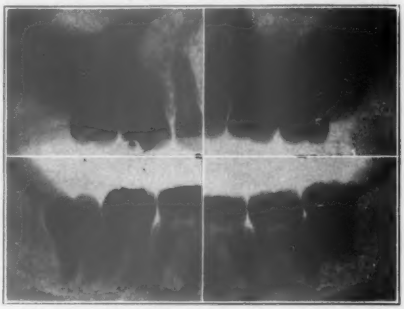

Fig. 16.—Case shown in Figure 15; four years later.

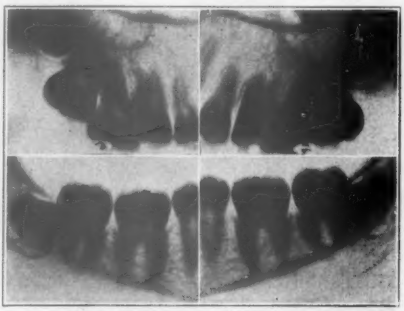

Fig. 17.—Class I case in patient aged 14 (taken in September 1936).

not be stated with assurance regardless of the treatment used. The teeth on the left side remained about the same, but those on the right side became more solidly impacted.

Figures 9 and 10 show a Class II, Division 1 case in a patient aged 18. The first pictures were taken in June 1934; the last in December 1938. The degree of impaction of the third molars increased under orthodontic treatment. All

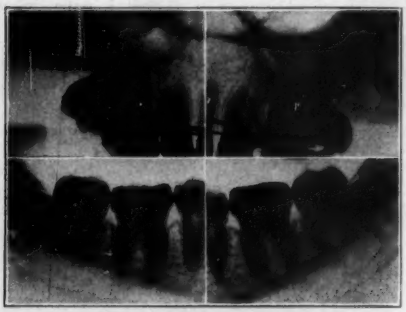

Fig. 18.—Films of case in Figure 17; taken in February 1938.

in a patient aged 18. From the models and roentgenograms, it is evident that the damage was due to an almost hori-

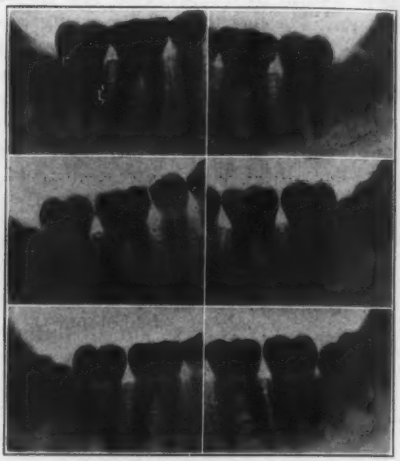

Fig. 19.—Class I case in patient aged 13. Above, May 1937, at beginning of treatment. Center, condition in October 1938. Below, condition in December 1939.

Fig. 20.—Apparent third molar involvement in patient aged 16.

third molars were removed at the conclusion of treatment.

Figures 11 and 12 show a Class I case

zontal impaction of the third molars, all of which were removed before treatment was instituted.

Figure 13 shows a Class I case in a patient aged 16, at the conclusion of treatment. In this case, although the roentgenograms indicate that the third molars were fairly upright in position, there was overlapping soft tissue present, which, with the position of the third molars far back in the angle of the ramus, was a source of frequent infection.

Figure 14 shows a Class I case in a patient aged 16. The upper pictures were taken in 1934, at which time it was evident that both lower second and third molars were impacted. In this case, the third molars were retained to favor growth and development. In the lower pictures, taken in December 1939, the left second molar was impacted more than the right. The third molars should have been removed to permit occlusion of the second molars.

Figures 15 and 16 show a Class II, Division 1 case in a patient aged 13. The upper pictures show the case at the beginning of treatment, in May 1934. More development had taken place in this case at this age than the average at beginning of orthodontic treatment; the last, in February 1938, at which time removal of the lower third molars was advised. The upper third molars present 13. In the films made four years later, the third molars have erupted in quite satisfactory occlusion, and it was believed that they should be retained for the present.

Figures 17 and 18 show a Class I case in a patient aged 14. The first pictures were made in September 1936, at the

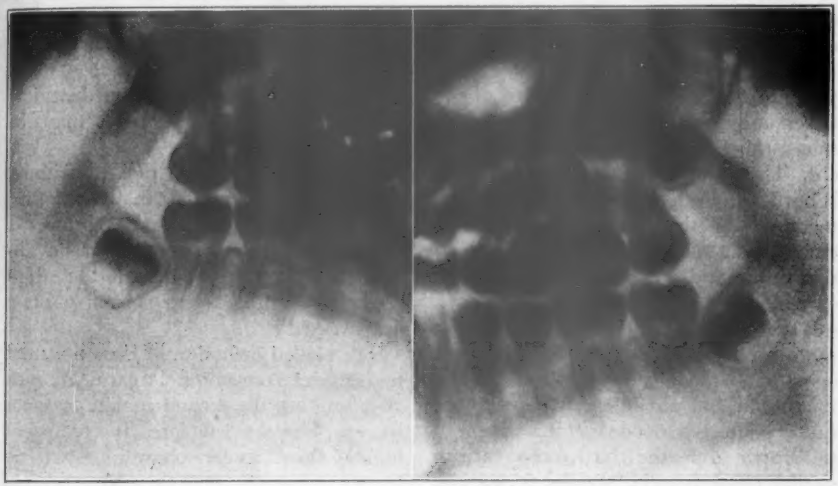

Fig. 21.—Roentgenograms of case in Figure 20; showing absence of third molar involvement. The condition was ascribed to nail biting and other habits.

Fig. 22.—Case of unerupted and underdeveloped third molars, presenting problem for orthodontist and oral surgeon.

an orthodontic and surgical problem which must be considered at a later stage of development.

Figure 19 shows a Class I case in a patient aged 13. The first picture was taken at the beginning of treatment, in May 1937; the next in October 1938, and the last in December 1939. It will be interesting to note the outcome of this case. The retention of the third molars does not look promising at present.

Figures 20 and 21 show a case in a patient aged 16. From the models of the lower anterior teeth, one would assume that a third molar involvement was present. The roentgenograms show that this is not true. Because of retarded development of the third molars, it was concluded that the disturbance was due to nail biting and other habits, which were corrected.

The case shown in Figure 22 presents quite an unusual problem in a patient aged 17. Not only are the third molars unerupted, but also the third molars are quite underdeveloped for this age. In the upper arch, the third molars are in similar position and of similar formation, and the upper left second molar is unerupted. This case presents a problem for both the orthodontist and the surgeon. The orthodontist must keep the case under treatment until the oral surgeon advises him that the third molar roots are sufficiently developed for successful removal. Most oral surgeons prefer not to attempt the removal of such third molars until the roots are at least partially formed.

In this case, it is apparent that the maximum adult growth pattern was attained before complete development of the third molar tooth.

CONCLUSIONS

Impacted third molars are often responsible for disturbance of occlusion.

Impaction of third molars occurring after the first twenty-eight teeth have erupted in normal occlusion may cause malocclusion in cases which have not undergone orthodontic treatment.

Periodic roentgenographic examinations at intervals of one year after about 16 years of age are advisable, to determine whether growth is normal. The tipped position of the third molar in its early development does not indicate impaction.

Extraction of third molars is not advisable until the adult growth pattern has been attained. In delayed dentition, considerable additional time may be necessary for a decision.

Extraction of third molars without partially formed roots is inadvisable, for surgical and developmental reasons.

The orthodontic case cannot be dismissed as completed until the third molars are erupted into normal position or extracted.

The skilled orthodontist does not need to consider compromise treatment, such as extracting the second molars to favor the erupting third molars. In competent hands, third molar operations are no longer so hazardous as they have been in the past and are advisable where indicated.

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A FUNCTIONAL DENTURE TECHNIC

By George P. Brenner, D.D.S., Milwaukee, Wis.

EVER since artificial substitutes have been constructed to replace lost teeth, it has been the profession's ambition to reproduce a cusp form with functional planes coordinated with mandibular movement and a centric relation that will seat dentures in function.

Soon after the eruption of the teeth, the masticating movements of the mandible, guided in its movements by the temporomandibular joint conformation and muscle action, wear down the tooth cusps as they pass over one another. This movement eventually results in a functional path and a cusp height harmonious with the mandibular movements, and the ideal tooth cusp form is evolved.

To develop this ideal, a conscientious attempt has been made to duplicate these movements in many types of articulators, which are so designed that the eccentric mandibular relations can be recorded, with a varying degree of accuracy, depending on the adaptability of the articulator and the accuracy with which the eccentric positions are recorded. The mandible would then be guided from the eccentric positions along a straight condyle path, in the mechanism, to the usually accepted gothic arch centric position.

We have long recognized the many shortcomings of articulating mechanisms, even those designed in a most ingenious and complicated manner. Each successive design becomes more involved in an effort to faithfully duplicate the mandibular movements, yet no one can be assured that the functional paths produced will conform to the demands of anatomic function; nor does experience prove that the masticating stroke ends in a gothic arch centric position. Hence, the introduction of the rotary grinder, which is intended to provide greater eccentric freedom.

As early as 1930, I visualized a center-bearing point functioning within a vertical dimension control which would direct mandibular movements to the limits of the vertical dimension of the tooth cusp form and allow freedom for the temporomandibular conformation and direction of muscle pull to influence these movements. Progress was made slowly until all the disturbing factors were eliminated. It was a process of trial and error, until each successive step could be positively checked for accuracy.

The approach to the subject was new to me, and new steps in technic had to be linked with those in accepted practice so that all links in the chain would be of equal strength.

The last difficulty in obtaining accuracy was finally eliminated by registering a second gothic arch centric relation with the upper completed denture, allowing ample time to seat the dentures well. Therefore, gothic arch and functional centric relation are registered under approximately uniform conditions.

The technic to be described, which has been used for the past three years, has proved that an occlusal form can be developed with a gothic arch and functional centric relation, and an eccentric balance in all positions of the cusp paths

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without corrective grinding after the dentures are completed and delivered to the patient.

It may be advisable to present a brief description of the physical form and relation of mandible to maxillae of the patient used in preparing this paper to distinguish it from an absolutely normal case.

The mandibular relation to the maxillae on the right side is normal, with the ridges in the working area parallel to each other. The labial portion of the maxillary ridge on this side is somewhat depressed owing to an injury received at an early age from the kick of a horse and which removed the anterior three or four teeth. On the left side, the maxillary ridge is well formed, but the mandibular ridge has been resorbed to a greater degree than the right side. The anterior portions of the maxillae are covered with slightly flabby mucosa, while the remaining portion of the mucosa is normal.

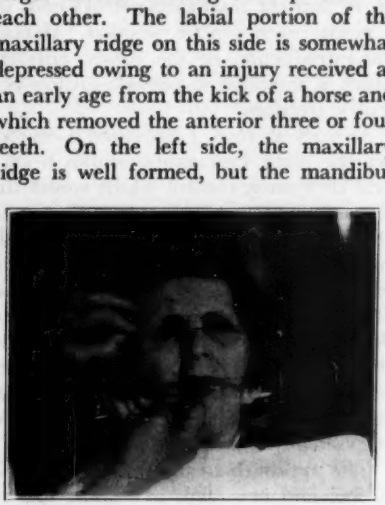


Fig. 1.—Upper incisor length determined in bite-block and parallel to pupils of eyes.

Fig. 2.—Occlusal plane parallel to ear-nose plane.

TECHNIC

A rosin base-plate is fitted to the upper cast and a black compound rim attached. This assembly is seated in the mouth and trimmed for length of the upper teeth (Fig. 1) on a line parallel with the pupils of the eyes, unless other influencing facial conditions demand otherwise. The occlusal plane is orientated to a position parallel to the nose-ear plane with a vertical dimension equal to the accepted length of the anterior teeth. (Fig. 2.)

The lower base-plate must be rigid and must be a faithful replica of the seating area of the finished denture. With this base-plate, all centric and functional records are made. To form the base-plate, two sheets of wax are adapted over the entire surface of the lower cast, extending well to the buccal line, but not covering the labial surface between the cuspids and on the lingual aspect to a line not including undercuts.

Between the cuspids, sufficient wax is added to make a vertically extending handle about three-fourths inch long. This wax pattern is carefully removed from the cast, invested in a flask and processed in vulcanite. This vulcanite tray is trimmed, partially polished and lined with compound tracing stick. The compound is uniformly glazed, dipped in cold water and quickly seated on the cast, which has been soaking in cold water. After the compound has hardened, the tray is removed by means of the handle, and the compound is trimmed to form and seated to be tested for stability. The vulcanite handle is now removed and a rim of black compound added. With this assembly, the approximate vertical dimension of the face and bite relation is established. The median

line is marked on the upper bite-rim and the casts are placed in their respective base-plates and assembled in a rigid hinge occluder.

The lower bite-rim is shortened about three-eighths inch, maintaining a parallel relation to the upper bite-rim. A flat metal plate is heated and embedded in the lower rim to a depth equal to its own thickness, its periphery continuing flush with the remaining rim. A center bearing jack is attached to the upper base-plate with compound and adjusted to contact the lower horizontal plate when the occluder is closed. The horizontal plate is coated with a thin layer of black carding wax and the entire assembly is seated in the mouth to check the correct position of the center bearing jack. The

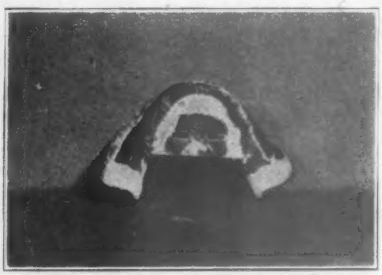


Fig. 3.—Lower base-plate assembly; test gothic arch tracing with center-bearing jack at posterior aspect of horizontal plate.

center bearing jack is relocated, if necessary, until the denture bases are seated uniformly under rapid and frequent closing pressure in centric relation. The patient is now trained to produce the gothic arch movements. (Fig. 3.) The vertical dimension is corrected if necessary and then maintained definitely through the entire technic.

The base-plates are returned to the occluder (Fig. 4) and a Stansbery gothic arch tracer is attached. The assembly is again seated in the mouth (Fig. 5), the gothic arch is developed on the tracer platform and, while the patient maintains a light pressure in gothic arch centric position, the base-plates are united with plaster.

When the plaster has set, the entire assembly is removed and seated on the upper cast (Fig. 6). The lower cast is removed from the occluder and placed in the lower base-plate and attached to the lower occluder arm with a minimum thickness of plaster. This places the cast in approximate gothic arch relation only, since the upper base-plate remains a factor of error.

The plaster core and gothic arch tracer are now removed and the center bearing post is checked against the stop screw of the occluder with a 1-1,000 sheet of cellophane to test for equal contact. This uniform contact might be disturbed by the expansion of plaster if a too thick

Fig. 4.—Casts mounted on occluder with compound bite-rims; lower bite-rim shortened one-quarter inch with horizontal plate and center bearing jack in position and gothic arch tracer attached.

layer is used for attaching the lower cast. A layer of plaster about one-eighth inch thick will not disturb the vertical relation. The lower base-plate is removed and set aside where it will not be marred, for future use.

A reinforced rosin base-plate with a wax bite-rim is fitted to the lower cast and trimmed flush with the labial and buccal contour of the upper compound rim, and the median line extended from the upper compound rim onto the wax rim.

The upper rosin base-plate with the compound bite-rim is now removed and

destroyed. Another rosin base-plate is adapted and a wax bite-rim is added and trimmed flush with the buccal and labial surfaces of the lower bite-rim. This reproduces the labial and buccal contours originally developed with the compound rims, and maintains the vertical dimension.

The upper anterior six teeth are set up and may be checked in the mouth for proper location of the median line and for appearance. The lower anterior six teeth (Fig. 7) are then placed in position.

The base-plates are seated in the mouth and the profile is checked in the occluded and the physical rest relations. The front view is checked in the occluded, physical rest and smiling relations. (Fig. 8.) All corrections of the upper anterior teeth for appearance must be made at this time and the incisal edges must be ground to the desired form. The base-plates are returned to the occluder (Fig. 9), and a strip of wax equal in height to the cusp is removed from the upper wax rim. The lower bicuspids and first molar are placed in such buccolingual position that the buccal cusps are directly over the crest of the lower ridge.

The upper bite-plate is removed (Fig. 10) to assure that the occlusal surface of the lower teeth is parallel to the stress-bearing area of the maxillary ridge. The upper first bicuspids and first molar are occluded to the lower, the lower base-plate is removed (Fig. 11) and the upper teeth are checked for correct positional relation to the lower ridge. The lower second molar is next placed in correct ridge relation (Fig. 12) and the upper second molar occluded with it.

The teeth on the opposite side are arranged in like manner and the waxed dentures checked in the mouth for balance in protrusion. Any necessary corrections are made at this time to secure an approximate balance. The upper cast, with the waxed denture, is removed from the occluder and the waxing completed and processed.

After processing, the cast, with the denture intact, is carefully removed from the flask, cleaned of all plaster, reseated in the plaster guides of the upper occluder arm and securely waxed to it with sticky wax.

Since there is usually a slight shifting of teeth during processing, the lower bicuspids and molars are warmed and the occluder is closed to contact with the vertical stop. To assure the same vertical dimension, this position is checked with the cellophane strip.

The bicuspids and molars of the upper denture (Fig. 13) are coated with a lubricant and compound cores attached to the lower waxed denture engaging the upper teeth.

The upper denture is removed and

Fig. 5.—Gothic arch center developed in mouth and base-plates united with plaster.

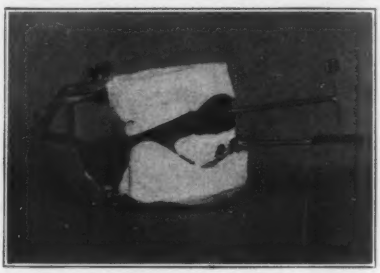


Fig. 6.—Mandibular cast remounted in occluder to gothic arch relation.

polished and the upper arm cleaned of all plaster. The polished upper denture is seated in occlusion with the lower teeth and in the compound cores, and securely waxed with sticky wax. Plasticene is used to fill all undercuts of the upper denture intaglio. The upper arm of the occluder is dropped to within one-sixteenth inch of the upper denture and attached with plaster. The compound cores are removed and checked with cellophane for expansion of plaster.

To this point of the technic, only approximate positional relations have been possible, yet they are sufficiently correct to place the upper teeth in harmony with the governing laws.

A rosin base-plate can never be so well adapted to a cast that it will fit as truly

Fig. 7.—Anterior teeth arranged according to length and outline established in bite-rims.

as the finished denture. For this reason, the lower base-plate is made in vulcanite and carefully lined with compound to cover the entire seating area of the lower denture. This base-plate is zealously guarded against marring and seated on the cast only when both are scrupulously clean.

From this point, absolute accuracy in seating the lower base-plate assembly and the upper denture is essential, since any inaccuracy will develop an equivalent inaccuracy in the finished dentures.

The upper denture is removed from the plaster attachment, the plasticene cleaned out and the denture replaced in position. (Fig. 14.) The lower waxed denture is removed and the lower bite-plate assembly is placed in position on the lower cast. A bulk of compound is melted into the palate of the upper denture and the center bearing post attached to it. The center bearing point may be located at a spot on the horizontal plate which was made with carbon paper after the approximate gothic arch centric relation was established. It may also be definitely located at the point of intersection of the median line, with a line drawn through the mesiobuccal cusp of the upper first molars, and contacting the horizontal plate.

All instances of abnormality must be recognized after the original and approximate gothic arch centric relation is

Fig. 8.—Teeth checked in mouth and to be changed if necessary for appearance.

established, and the second bicuspid and the first molar are placed in that relation to the center bearing post. Teeth may have to be added or eliminated or spaced, as the case may require. The mesial cusp area of the upper first molar occupies a still position as influenced by and related to the center bearing point, and the center bearing post, after it is removed, directs the seating of the finished denture in the same direction.

The completed denture and lower base-plate assembly are checked in the mouth for stability. Very slight, if any, corrections should be necessary.

The denture and lower base-plate are

returned to the respective casts and the gothic arch tracer is attached. A correct gothic arch centric relation may now be recorded. (Fig. 15.) The lower cast is removed and adjusted to this final relation on the occluder. It is advisable to be rather deliberate in recording this final gothic arch relation, to allow sufficient time for seating the upper denture and the lower base-plate. By this means, a most satisfactory gothic arch centric relation can be recorded and be of great value for accuracy in the succeeding steps.

The gothic arch tracer and plaster core are removed and the point where the center bearing post touches the horizontal plate is spotted with carbon paper. The vertical dimension plate is attached to the horizontal plate by means of two screws, which are set free enough to allow movements with slight friction (Fig. 16). The circular opening on the lower side of the vertical dimension plate is adjusted to circle on the center spot uniformly. The upper arm of the occluder carrying the denture and center bearing jack (a) is lowered and held firmly in contact with the horizontal plate (c) and, with the aid of a flat tool, the vertical dimension plate is pushed backward to contact with the jack at d. The occluder is opened and the vertical dimension plate sealed to the horizontal plate with sticky wax, to eliminate movement in tightening the screws. The space between F and G allows sufficient space for the mandible to find its functional centric position without interference with the inclined planes. The lateral movement has a horizontal freedom equal to about one-half the protrusive movement. This horizontal freedom incorporates in the occlusion of the completed dentures a slight lateral and protrusive freedom before the vertical movement is attempted.

Since the horizontal freedom in a horizontal plane is developed by movements of the mandible, the resultant horizontal plane in the occlusion of the lower teeth is an equivalent of the temporomandibular guidance, muscle pull and tissue influence, which develop a horizontal plane in positional harmony with these three influencing conditions.

Fig. 9.—Lower bicuspids and first molars in correct position.

Fig. 10.—Occlusal surface of lower bicuspids and first molar parallel to maxillary ridge.

The lower bite-rim must now be prepared to control the displacement of the wax used in developing the functional cusp paths of the upper teeth. The lower bite-rim is built up with stiff base-plate wax to within one-sixteenth inch of the upper teeth, and the inside of the vertical dimension plate is covered with a thin coating of black carding wax. Kennebec wax is softened over a flame and laid on top of the base-plate wax (Fig. 17) with which the bite-rim was built to the desired height. The upper denture is dipped in cold water and immediately pressed into the soft Kennebec wax until the center bearing jack marks

its location through the carding wax on the horizontal plate. Care must be taken that the bulk of the excess wax is expressed in a lingual direction and that any excess appearing on the buccal and labial aspects is trimmed flush with the teeth. The labial and lingual edges of the Kennebec wax are reinforced with tough sheet-wax, and the lower bite-rim is ready for developing the functional tooth paths. (Fig. 18.)

The upper denture is seated in the mouth and that portion of Kennebec wax which engages the upper anterior six teeth is made extra soft by dipping in warm water at 135° F. This is done to reduce the resistance in that area in closing in protrusion, so that only the bicuspids and molars may engage in a moldable mass of wax of more or less uniform thickness, reducing the distorting forces to a minimum.

Fig. 11.—Upper bicuspid and first molar occluded with the lower.

Fig. 12.—Second molars in position completing set-up.

The gothic arch centric relation on the center bearing jack has seated the denture and base-plate in as steady a relation as the tissues will permit, and, with this as a guide, all the eccentric relations can be developed to the same degree of stillness or balance.

With the lower base-plate seated in the mouth, the patient is instructed to close and apply pressure to firmly seat the denture bases.

The lower base-plate is now held in position and the patient directed to close in a protrusive position, slightly in excess of the horizontal distance between the upper and lower teeth. This is done with a minimum amount of pressure, with frequent opening of the jaws to see whether the jack has penetrated the black carding wax on the horizontal part of the vertical dimension plate. The patient is then instructed to move the jaw slowly backward and to close the teeth at frequent intervals until an inclined plane has been developed.

He is then instructed to close in protrusion and slide the jaw backward under light pressure. The lateral movement is developed in the same way, but a lateral movement about one-half the width of a bicuspid is preferred. These movements are continued until the path of the jack is visible on the inclined planes of the vertical dimension plate, when the patient is again instructed to close frequently in centric position until the jack has again penetrated the wax on the horizontal plate.

The lower bite-plate is now removed. The functional wax form is chilled in cold water and the carding wax in the vertical dimension plate reglazed and returned to the mouth for the final chewing and checking for balance in all positions, as related to positive contact of the center bearing jack on the vertical plane of the vertical dimension plate. It is advisable to check each step with a thin wood applicator attached to the upper denture until the functional form is de-

veloped to a point where the maximum stillness is attained. The denture and base-plate are now removed from the mouth, the functional wax form is dipped in cold water, the carding wax on the vertical dimension plate is reglazed and the upper denture is firmly seated in the now functional centric relation and is tested for stability. (Fig. 19.) If there is no rock, and the jack penetrates the black wax, we have established a balance in functional centric relation with the

Fig. 13.—Processed upper denture seated in occlusion with lower teeth and compound coring and luted to upper arm of occluder with plaster.

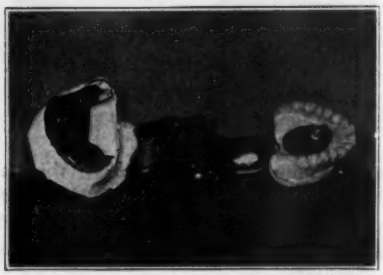


Fig. 14.—Lower wax set-up replaced by lower bite-rim assembly and center-bearing jack placed in proper position on upper denture.

jack maintaining the exact vertical dimension, and directing equalized seating pressure. The wax bite equalizes tissue resiliency until functional harmony has been established between the center bearing jack and the functional wax form.

In seating the upper denture in functional centric relation, it will be noted that the bared spot in the carding wax is always 0.5 mm. or more back of the gothic arch centric position. This is partly due to better seating of the denture base in developing the functional paths and the natural and unstrained movement of the mandible when completing the masticating stroke.

The denture is then tested for stability in the eccentric positions. If there is no rock with the center bearing jack in contact with the inclined plane, we have established a perfect balance in these

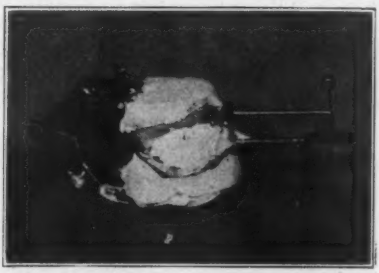


Fig. 15.—Gothic arch tracer again attached and second gothic arch center developed in mouth with finished upper denture under pressure maintained for five to ten minutes. The lower cast is remounted to this new relation.

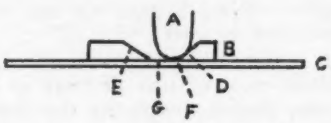


Fig. 16.—A, center bearing jack. B, vertical dimension element. C, horizontal plane. D and E, vertical planes. F and G, horizontal clearance.

positions and in all intermediate positions along the functional paths back to functional centric position.

This check is positive, since it is checked by the same principle as three legs of equal length attached to a horizontal arm and resting on a horizontal plane (Fig. 20). If leg C or E is short, a rocking is developed on D which is easily noticed. However, if leg D is short,

there may be a lack of balance with no means of detecting it. The leg D is absolutely necessary for perfect balance.

Does it not seem reasonable that the more time we consume in recording the final and corrected gothic arch centric relation and the functional cusp path forms, the better the denture bases are seated on the tissues in completing these operations? It must, therefore, necessarily follow that the finished denture with an occlusion formed under these conditions maintains a correct tooth relation to jaw relation for a definitely longer time. Dentures constructed by employing these principles always appear to be, and are, occluded in retrusion, the degree depending on the softness of the tissue when they are seated in the mouth, but they return to correct occlusion when the denture bases are seated.

Fig. 17.—Functional wax assembly in gothic arch centric.

Fig. 18.—Functional wax and vertical dimension element in proper relation to gothic arch center.

The lower base-plate is returned to the cast and prepared for flowing the stone cast of the functional form. The upper arm is removed from the occluder and another put in its place. The stone model is poured and attached to the upper arm in one process (Fig. 21) and, as soon as the stone has attained its initial set, the entire assembly is placed in cold water, to prevent the development of heat and expansion. After the assembly is allowed to set in cold water, for about thirty minutes, the stone cast is easily pried from the wax form and checked with 1-1,000 cellophane for possible expansion. I have yet to find expansion of the stone cast chilled in flowing water.

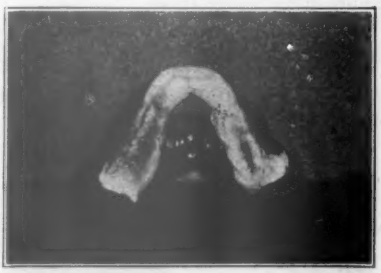


Fig. 19.—Functional cusp paths developed.

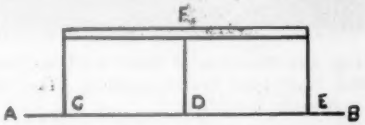


Fig. 20.—Mechanical principle employed to determine absolute balance.

Fig. 21.—Stone cast pored in functional wax form.

Figure 22 shows the functional cusp form of the teeth of the upper denture. In it is recorded the functional balanced centric relation, the balanced eccentric position as it is attempted with wax check-bites, the path of cusp travel from eccentric to functional centric position, lateral and protrusive cusp clearance, and the proper clearance of the second molars in centric relation.

This is all developed in the wax by the natural and easy masticating stroke of the patient. Naturally, some patients require considerable training and may have to return for one or two extra appointments before they get the idea, but when they do, it is well worth the effort, because the occlusion will be perfect in the finished denture.

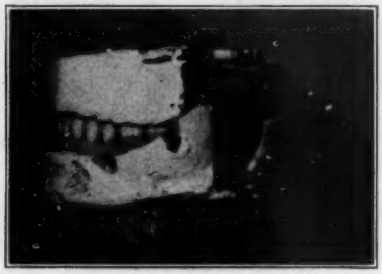


Fig. 22.—Relation of lower teeth to functional tooth form before grinding. The lack of conformity is evident.

Fig. 23.—Processed lower denture replaced in occluder without removal from cast and inaccuracies ground out in gothic arch centric relation.

After the functional cast is separated and dried, the lower base-plate is replaced with the lower wax denture. It will be remembered that the lower teeth were placed in occlusion after the last gothic arch centric relation was established and, therefore, are in correct vertical relation to the upper denture.

When occluding the lower teeth with the functional form, however, we readily see the difference between anatomic and functional tooth form. The anatomic cusp form of the lower teeth prevents the functional form from closing the occluder. The interference is always on the cusp planes and, in the final grinding, in the bottom of the sulci of the second molars, depending in degree on the characteristics of the patient developing a lack of second molar contact in centric relation.

Before attempting to grind the teeth to this functional form, it is advisable to

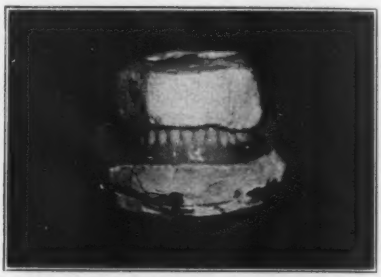


Fig. 24.—Final grinding of lower teeth to functional form, showing close adaptation.

Fig. 25.—Completed dentures.

remove the six lower anterior teeth and grind the bicuspids and molars by spotting with carbon paper to a point where the stop screw in the occluder grips about two thicknesses of cellophane. Should any of the tooth cusps be short of the functional form at this point, the functional form cast is removed and replaced by the upper denture. The lower teeth not in full occlusion with the functional cast are removed and replaced in a raised position and the cusp form ground deeper. The tooth is then warmed and pressed into even occlusion with the remaining teeth. The functional cast is again placed in the occluder and the grinding completed.

The six anterior teeth are replaced and may be adjusted vertically to a position where the minimum amount of grinding is necessary to develop a uniform functional form for the incisal edges.

The lower cast and waxed denture are now removed. The waxing is completed, processed and removed from the flask without removal of the lower denture from the cast. This is very important to maintain the accurate vertical dimension.

The denture and seating surface of the cast is thoroughly cleaned of all plaster and firmly and accurately attached to the coring on the lower arm of the occluder. (Fig. 23.) The occlusion is given its final corrective grinding to the recorded gothic arch vertical dimension with the upper denture and then to the functional form. (Fig. 24.)

The lower denture is removed and finished. It is then ready for delivery to the patient. (Fig. 25.)

CONCLUSIONS

Each step is simple and logical, but only absolute accuracy assures success. The mandible is given absolute freedom to develop cusp paths, and, when the principles of this technic are applied in the construction of a full upper denture, the most fantastic arrangement of the lower teeth offers no interference with a perfect balance.

The gothic arch centric and functional centric positions maintain the same vertical dimension as when controlled by the center bearing jack.

The functional form is developed in a wax rim which compensates for tissue resiliency in the centric and eccentric relations.

The eccentric positions and functional paths can be developed to such a degree of accuracy that a minimum degree of stillness in function is obtained and is assured in the completed denture.

The accepted cusp height of the inclined planes of the vertical dimension plate is a tooth cusp height which is a component of this plane and the mandibular movements as influenced by the condyler inclinations.

All mandibular movements are coordinated around a center bearing point and controlled vertical dimension.

Cusp height is developed to conform to the anatomic conformations of the temporomandibular joint. This eliminates the controversy as to whether a flat or a steep cusp shall be used, either being employed as the condition demands.

I am grateful for the many years of association with the leading minds in the field of denture prosthesis and wish to give full credit for the benefits derived from this association.

1247 Bankers Building.

CONSTRUCTION OF THE PORCELAIN VENEER CROWN

By J. Raymond Gill, D.D.S., San Francisco, Calif.

CERAMICS is in dentistry both a science and an art. It is obvious that one must have a knowledge of both of these phases of ceramics to meet the highest esthetic requirements in the restoration of lost function by the use of porcelain crowns.

I do not wish to imply that complete technical knowledge of chemistry and physics is absolutely essential. However, one must have sufficient didactic and technical instruction to be qualified to handle this material. We must acknowledge the fact that the student does not have sufficient training in this important field and that few dentists express sufficient interest in dental porcelain to perfect themselves in such a skilled technical procedure. It can, therefore, be readily understood why this artistic field of dentistry is left to the laboratory.

The fact that a great many of the esthetic reproductions in dentistry are based on the fundamentals of ceramics implies that far more time should be allotted in the curriculum to its study. This statement will, of course, be challenged on the basis that all students have not the artistic ability which finds its expression in creative art and, therefore, need not be trained in this highly specialized branch of dentistry. This, however, is not a logical excuse, since, for the most part, the successful practice of dentistry, especially in the restorative field, depends upon the application of creative art. Therefore, the student should be given a thorough training in the esthetic aspects of dentistry and also the application of creative art to dentistry. Also, the student should be taught to appreciate fine art. Without this training, it is impossible to express oneself.

Why should we consider a knowledge of the chemistry and physics of ceramics as a prerequisite to the use of ceramics in dentistry? It is obvious that one must have some knowledge of the materials that are used and how they are to be applied in the development of a creative art. It is not essential that one should know the laws of batch or molecular formulae to obtain a porcelain that will be suitable for use in dentistry, but he must have some knowledge of the thermochemical reactions of the porcelains that are placed in the market for dental use.

The manufacturer today makes a variety of fusing porcelains, to meet the varied demands of the dental ceramist. This variety pertains not only to fusing temperatures, but also to hues and shades, which are sufficient to achieve any esthetic standard. However, the dentist must have some understanding and knowledge as to how and where to use these porcelains; also as to how to change their fusing temperatures to meet individual requirements. It may be apropos at this time to discuss some of the essentials in the use of this material.

Porcelain as it is given to the dental

From the Division of Crown and Bridge Prosthesis, College of Dentistry, University of California.

Read before the Section on Crown, Bridge, Partial Denture and Full Mouth Reconstruction at the Seventy-Sixth Annual Midwinter Meeting of the Chicago Dental Society, February 14, 1940.

profession is a mixture of various ceramic materials in balanced batch and molecular formulae to fuse at certain specified temperatures. This is then prefused to eliminate the greater part of the contraction. Igneous material is eliminated also, and handling and manipulation are facilitated. The ingredients which are used in obtaining color are metallic oxides, and these are added previous to prefusing. The porcelain is then ground to a very fine mix and is ready for distribution. Therefore, if one has some technical knowledge of the making of porcelain, he will be able to alter the fusing temperatures to meet any specific need.

To express this in a more technical manner: If one is desirous of lowering the fusing point of a certain porcelain without changing the color, fluxing will suffice. As an example, the addition of any one of the glazes results in a reduction of the fusing point. The amount of fluxing needed will depend on how much reduction in temperature is required. For example, the addition of 1 part of finishing glaze to 4 parts medium fusing porcelain reduces the fusing temperature approximately 200 degrees. One may also, by adding a medium fusing porcelain to a higher fusing porcelain, reduce the fusing temperature proportionately to the amounts added.

The mixing of colors may be considered both a science and an art. It is necessary to mix various colors in certain proportions to meet the requirements of matching the colors of the teeth. One must use caution and must have experience in incorporating these colors so that the exact hue or shade can be obtained. When a deeper shade is wanted, only a small portion of the darker color should be added. When a lighter color is required, it is necessary that a proportionately greater amount of the lighter color be incorporated. This will apply equally when stains are to be used to modify color or distribution.

CONDENSATION

There are considerable confusion and differences of opinion concerning the results obtained with different methods of condensing dental porcelain. In articles published in THE JOURNAL (1930-1931), I discussed the results of the various methods of condensation. It is shown, in these articles, that when porcelain is condensed in a confined matrix, the minimum shrinkage is obtained during firing. Also, by this method, the particles are brought into closer apposition, permitting a more nearly uniform and rapid chemical reaction during the process of firing.

Felcher, in "Porcelain in Dentistry," states that "by this method of condensation, strains are produced and irregular surfaces are obtained while carving." If we study the thermochemical changes, we find that the porcelain is in equilibrium

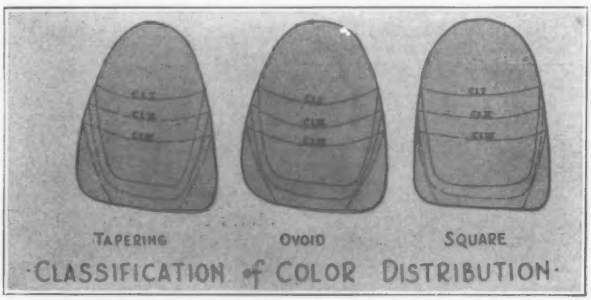


Figure 1.

at the temperature of high vitrification. Therefore, if there have been any strains in the porcelain in condensing and handling, these will be relieved at the stage of vitrification. Condensation within a confined matrix gives a very hard, dense mass of porcelain to carve and one from which the confined hydroscopic water is not eliminated very readily. This then facilitates the handling of the porcelain because is maintains its hardness over a greater period of time.

FIRING OF DENTAL PORCELAIN

The firing of dental porcelain requires some knowledge of the thermochemical changes that take place at the various temperatures during the firing process. As mentioned above, we have at our disposal porcelains that have various fusing points, depending entirely on the amount of fluxing agent added. The lower the fusing point of the porcelain, the lower the temperature at which the chemical reaction begins.

We may consider these changes and classify them as the physical and chemical changes or periods. During the physical change, we have the confined hydroscopic and chemically combined water driven off. We also have carbonization taking place. The furnace should be preheated prior to the insertion of the condensed porcelain. The temperature within the muffle should register heat low enough to avoid internal combustion, which would result in an internal distortion of the porcelain. The temperature within the muffle should then be permitted to rise slowly until the pyrometer indicates a point at which the chemical reaction begins. From this point on, the temperature timing is infinitely important. There is some difference of opinion as to the timing of the temperature during the firing procedure. Any one of these procedures may give satisfactory results, but one must adhere to a definite schedule.

The fusing of porcelain is based on both time and temperature. Therefore, it is essential that we set up a definite time schedule to regulate temperature increase. No two muffles are uniform in heat registration. Even thermocouples may vary. Therefore, to give the average practitioner without a great deal of experience a firing schedule that requires

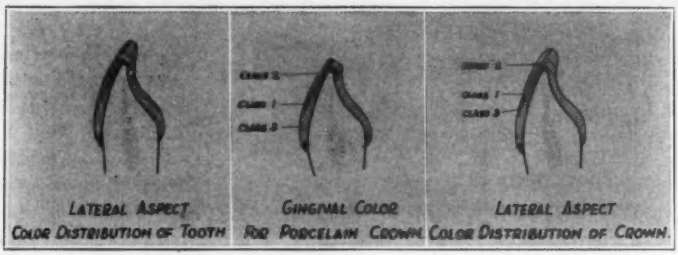


Figure 2.

him to hold the rheostat control on a definite button for a given length of time is not adequate for uniform results. But if the time schedule is calibrated so that the pyrometer reading indicates a definite temperature in a given length of time, and if the dentist adheres to this schedule, uniform results can be obtained with any furnace. The time can be varied, but the temperature must be altered according to the increase or decrease in time. For example, if the firing time is lengthened, the temperature is decreased, and vice versa. However, it is recognized in the ceramic industry that the increase of time and the lowering of the temperature give more nearly uniform and better results. I shall discuss

later in this paper the firing range of the schedule advocated.

ANNEALING

Too much emphasis cannot be placed on the importance of annealing for obtaining the greatest strength in porcelain restorations. After the final firing, the porcelain is permitted to cool slowly in the muffle to either a cold muffle or a temperature below 400° F. Tests made at the University of California reveal a difference in compression strength of from 350 to 500 pounds between the specimen when taken out of the furnace at 800° and when removed at 400° or below. Dental porcelain is allied to glass. If one has had experience in the use of glass or has observed its manufacture, one can readily understand the extreme importance which is attached to annealing.

Fig. 3.—Charting the color distribution in a tooth.

To have ability in the creative art of dentistry, a knowledge of the following subjects is imperative: dental anatomy, color selection and distribution, alinement and surface texture. Dental anatomy may be considered paramount to any one of the other subjects. While I was a student and in my early years in the dental profession, Dr. Vehe stressed dental anatomy as the most important subject in dental ceramics. He insisted that one must master dental and applied anatomy if success was to be achieved in the field of dental ceramics. Later, Dr. Orton expressed the idea more conclusively by stating: "Dentistry is a fine art. To master this, one must not only have a thorough knowledge of these subjects, but must also have the skill to interpret it."

It is essential that one have the skill to reproduce in the restoration every detail of the anatomic form. This implies that one shall have a thorough training in applied dental anatomy; also that he shall observe the minutest details in the applied art. Every line, each concave or convex surface has a definite meaning in the esthetic restoration. The dentist must have a thorough knowledge of the classification of tooth forms. J. Leon Williams has classified the anterior teeth into three different typal forms: square, ovoid and tapering. M. M. House has enlarged on this classification to meet the combinations of different typal forms and their modifications or combinations. He classifies them into nine different groups. In this grouping, he has found combinations of Dr. Williams' three classifications. He has also included in his classification the different forms or contours of labial surfaces.

If one with a creative ability studies this classification and observes Nature, the artistic reproduction will not be difficult.

COLOR SELECTION AND ITS DISTRIBUTION AND SURFACE TEXTURE

Color selection and its distribution are second in importance to applied anatomy. Fortunately, all teeth in the same mouth have not exactly the same color distribution. But there is a definite harmony. Neither are the color and its distribution the same in youth as in adulthood, owing to the changing relation of the pulp to the surface of the tooth through either advancing age or attrition and abrasion.

Dr. Vehe, Dr. Orton and I classified the color distribution of the teeth from several hundred charts taken from practical cases. (Fig. 1.) Color distribution

was first classified according to anatomic form and, second, according to changes caused by attrition and abrasion. Such segregation resulted in three distributional classifications for each anatomic classification and, at the same time, a complete classification of changes which may be attributed to attrition. (Fig. 2.)

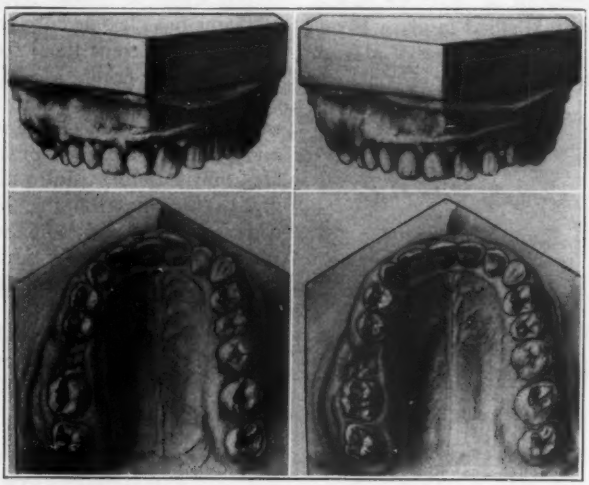
It was then necessary to classify the change that can be attributed to abrasion. Again this classification fell into three groups and the various anatomic forms of the teeth. Therefore, we may have a classification of either that caused by attrition or abrasion or a modification or a combination of the anatomic classification.

In considering this vast range of color combinations, it is obvious that color distribution in the teeth must be determined by scientific methods. Also, there must be established a definite procedure in achieving its reproduction, as otherwise the possibility of a faithful technical interpretation of color and its distribution is exceedingly remote.

Changes due to attrition and abrasion may not only affect the color of the tooth, but also alter the color illusion resulting from stains in the enamel. In selecting color, one must have at hand a shade guide made from the porcelain to be used in the restoration. The porcelain bought from the manufacturer will vary in color to some degree from various batches obtained. Therefore, to select the color from the stock shadeguide is not the most scientific method. It requires very little time to make a dependable shadeguide.

In the color selection for porcelain restorations, it is imperative to have a direct light. Cross lights interfere with vision by casting conflicting shadows which render impossible the determination of true color values. The best source of light is a northern exposure, and the best hours are those between 11 a.m. and 2 p.m. The patient should be placed in such a position that the tooth for which the color is being selected is in the same horizontal plane as the line of vision. The tooth should be kept moist.

First, the gingival hue is selected, with



A B

Fig. 4.—A, correct alinement; B, incorrect. The alinement and position of the teeth should be restored to maintain and not alter the facial appearance of the patient.

the lips raised, and the shadeguide in the exact position which the restoration will take when finished. Second, the incisal shade is selected, with the lips pursed in the speaking position, because it is in this position that the teeth are seen either in speaking or at rest, and therefore this is the most nearly true incisal color.

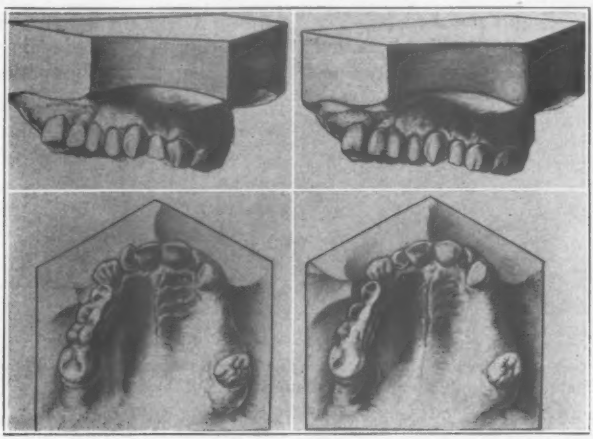
Notations of shade and color are then made on the chart, the selections being made for both the gingival and the incisal portions.

During the process of color selection, care should be taken not to prolong concentration on the object, to avoid visual fatigue, which may cause registration of the complementary color of the object and surrounding environment. As Vehe states, green may be seen in teeth that are in juxtaposition with the red lips, if visual fatigue occurs. Therefore, it is obvious that color selection should be made as quickly as possible; that this should be done under light conditions as nearly perfect as possible, and that frequent rest should be given the eyes to overcome fatigue when color selection is difficult or protracted.

The color having been selected, distribution, an equally important part of the procedure, is given attention, since color distribution and its interpretation can affect either favorably or unfavorably the final results. (Fig. 3.)

The method employed for obtaining color distribution is charting on the tooth the portion into which the gingival color extends incisally or occlusally and then locating the portion covered by the incisal color and its extent gingivally. The saturated incisal shade on the mesial and distal aspects is also located. Then, with pencil, these points and lines are connected, and we have the outline of the distribution of the color on the tooth. This outline is then transferred to a chart for the particular tooth studied and becomes a part of the record. We also chart the various stains and their positions, and then select the color for the stain. Thickness of the tooth and the typal form determine, to some extent, the color and distribution.

He who has learned the science of light, shade and color; who has learned how to observe and to record them, and who has learned to manipulate them to



A B

Fig. 5.—A, correct alinement; B, incorrect. The alinement and position of the teeth should be restored to maintain and not alter the facial appearance of the patient.

obtain various effects has learned the means of achievement in porcelain work. He has grasped the science and is prepared to master the art.

Light and shadows may influence the restoration in some degree, especially if the teeth are rotated or if they overlap. As mentioned previously, porcelain has not the same light refraction as the tooth. Therefore, in a few cases, it will be necessary to dilute the color where light shadows are cast.

Surface textures and irregularities are also noted and charted. It is important to reproduce the surface texture, to meet the esthetic requirements. Some believe that the surface of the porcelain crown should be ground and polished previous to the final bake. With this, I cannot agree, for the reason that the light refraction of porcelain is not the same as that of the tooth. Light reflected from the natural tooth is dispersed at various angles owing to light absorption and diffused reflection from the enamel. The surface of the porcelain crown should be slightly irregular, to simulate the light refraction or diffused reflection of the natural tooth. Some crowns require greater irregularity than others, owing to environmental conditions.

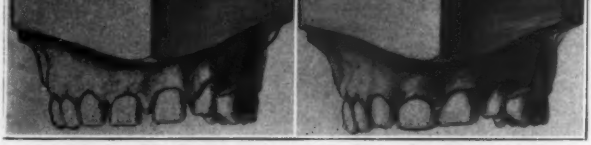
ALINEMENT

Alinement may be considered under the classification of dental anatomy, but I have placed it in a special category to emphasize its importance. Alinement of porcelain restorations should follow as closely as possible the existing condition. (Figs. 4-6.)

To alter the alinement, it is necessary also to alter the anatomic form of the restoration. This, then, means that it will be necessary to change the anatomic form of the tooth to meet the esthetic requirements of the patient. Not only is this done, but the mesial and distal dimension are decreased in restoring the tooth's surface with an artificial substitute that is narrower than in the original. This will make the tooth appear longer and will, in time, affect not only the mental outlook of the patient, owing to what he considers a deformity, but also his facial habits. The same is true when the anterior teeth are spaced. (Fig 6.)

An attempt may be made to close the space; which, in turn, not only increases the width of the tooth or teeth, but also makes the crown appear shorter. Not infrequently, the patient requests these types of restorations. With our knowledge of the results, it is incumbent on us to correct this mental attitude by showing the patient the unnatural esthetic effect of this procedure. This may be done either on a model or by restoring the mesial and distal surfaces of the teeth to be crowned with cement previous to preparation of the tooth. I recommend this idea in lieu of another restoration when the patient becomes dissatisfied.

In extreme cases, to achieve greater satisfaction and win the good will of the



A B

Fig. 6.—A, correct alinement; B, incorrect. The alinement and position of the teeth should be restored to maintain and not alter the facial appearance of the patient.

patient, it should be suggested that the case can best be treated by orthodontic measures, to be followed by porcelain restorations or bridgework, as the case may require. With a knowledge of the subject, as discussed, construction of the crown is simplified. To expect an esthetic restoration without a knowledge of the subject is vain. This is only too apparent as we observe the conditions existing in the mouths, not only of those people who come into our offices, but also of those whom we see in all walks of life.

Therefore, in the restoration, technical interpretation requires an ability to observe in detail the existing conditions. This technical interpretation may be more valuable if a condensed description of the construction of a porcelain veneer crown is given.

THE PORCELAIN VENEER CROWN

I shall not discuss the preparation and the making of the matrix, but shall start with the condensation of the porcelain. There are several methods of condensing dental porcelain. In this instance, I shall discuss the method that others, as well as I, have, after exhaustive research, found to give most satisfactory results. It is imperative that the porcelain be condensed in some form of mold wherein maximum density and particle association can be obtained. Therefore, after the platinum matrix has been formed, it is removed from the die. The inner portion is oiled to permit removal from the plaster form. Plaster is placed in the matrix, and a small amount is placed on a glass slab about 1 inch high. The matrix is then placed on the mound of plaster and the plaster is permitted to set thoroughly. After setting, the plaster is trimmed so that the mesial and distal sides of the form follow out the mesial and distal cervical outlines of the prepared tooth, and further so that its planes will converge rootward. This will permit the paper matrix, which will be wrapped around the plaster form, to diverge incisally or occlusally.

The labial and lingual surfaces of the plaster form are trimmed so that the planes will diverge rootward. To determine whether there is sufficient convergence of the mesial and distal walls of the plaster form, or sufficient divergence of the paper matrix, a flat instrument is placed on both the mesial and distal surfaces of the plaster form and the platinum matrix is paralleled to that of the die in the working model. The instrument should extend mesially or distally slightly beyond the contact points of the adjacent teeth in the model. By this means, we can determine accurately the width that the condensed porcelain should be. The gingival portion of the platinum matrix is shellacked to permit the porcelain to pull away from the platinum matrix during the initial firing. A semiglazed piece of paper is wrapped around the plaster form and is held in place by lock tweezers. The inside of the paper is moistened to permit uniform flow of the porcelain while it is being inserted in the mold. (Fig. 7.)

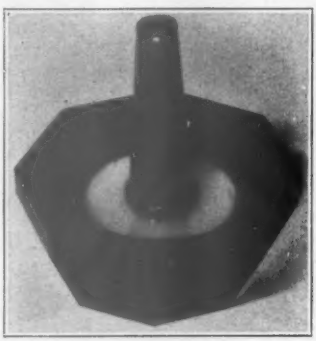


Fig. 7.—Agate mortar and pestle for grinding of porcelain.

The gingival color is then mixed by placing the porcelain in an agate mortar, using distilled water and an agate pestle. This is then ground. With this method, uniform plasticity can be obtained. (Fig. 8.)

The porcelain is then placed in the mold and vibrated by the use of a serrated instrument moving back and forth over the lock tweezers. The addition of porcelain and further vibration is continued until the mold is filled. Vibration is continued for about three minutes after filling of the mold to permit uniform settling of the particles of porcelain. If the water is removed immediately, it will be difficult for the moisture to penetrate the area in which the water has been absorbed. As a result, the gingival portion of the porcelain will not be so thoroughly condensed as the incisal portion. After the three-minute vibration, the hygroscopic water is removed by absorption and the mold again vibrated before porcelain is added to fill up the mold. This prevents the entrapping of air. Vibration and absorption are continued until no more water can be removed. The greatest amount of hygroscopic water possible has been eliminated. The remainder of the hygroscopic water and the chemically combined water can be eliminated only by heat.

The paper matrix is now removed and the excess portion of porcelain over the apron of the matrix is trimmed away. The condensed porcelain and platinum matrix are removed from the plaster form and placed on the die. The die is inserted in the model, and slight trimming of the mesial and distal aspects of the condensed porcelain may be necessary to permit the die and the condensed porcelain to be seated accurately in the model. The crown is then carved to full contour on the working model. The lingual anatomic form is reproduced in the condensed porcelain at this time. We are then ready to interpret the color distribution in the condensed porcelain. The purpose of carving the condensed porcelain to full contour is to facilitate accuracy in determining the amount to be removed on the labial, mesial and distal aspects for the correct interpretation of the color distribution.

From the chart, the amount of porcelain to be removed from the mesial and

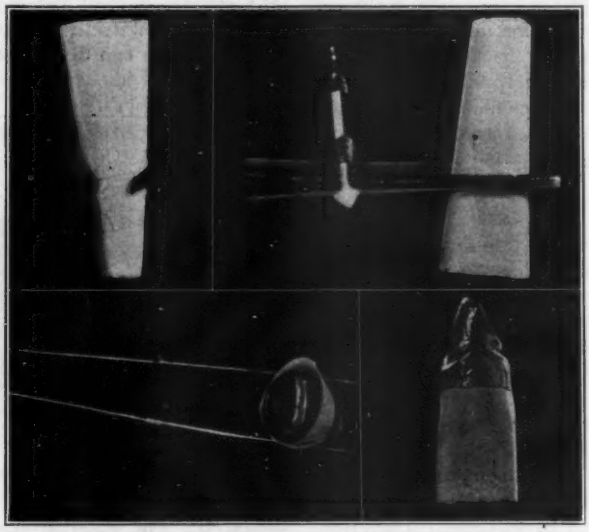


Fig. 8.—Method of obtaining thorough condensation of porcelain. The paper matrix is placed around the plaster form and held in place by tweezers. The serrated instrument is used as a vibrator to obtain the maximum density.

distal aspects for the overlapping of the incisal color is determined. (Fig. 9.)

The amount for overlapping of the incisal color on the labial surface is then removed from the labial portion of the condensed porcelain, following the outline as described in the color chart. Any further carving, such as developmental grooves and etching for deep stain, is done at this time.

The condensed porcelain and matrix are then removed from the die and placed in the furnace, which has been preheated to a temperature of approximately 400° F. The first porcelain or body used is the high fusing porcelain. The purpose of this is to vitrify and then add a lower fusing porcelain for the remainder of the contour to prevent overglazing or oxidation and burning out of the color by repeated firings. After the piece is placed in the muffle, the temperature is increased slowly to 1900° F. At this temperature, timing of the firing is begun. (Fig. 10.)

The temperature is increased to 2100° F. in five minutes. This may necessitate moving the rheostat up to the first, second or third button. The temperature is then held for ten minutes at 2100° F. This is termed the soaking period, permitting a uniform heat penetration throughout the entire body of the porcelain. This also permits a uniform chemical reaction between all particles in the body of the porcelain.

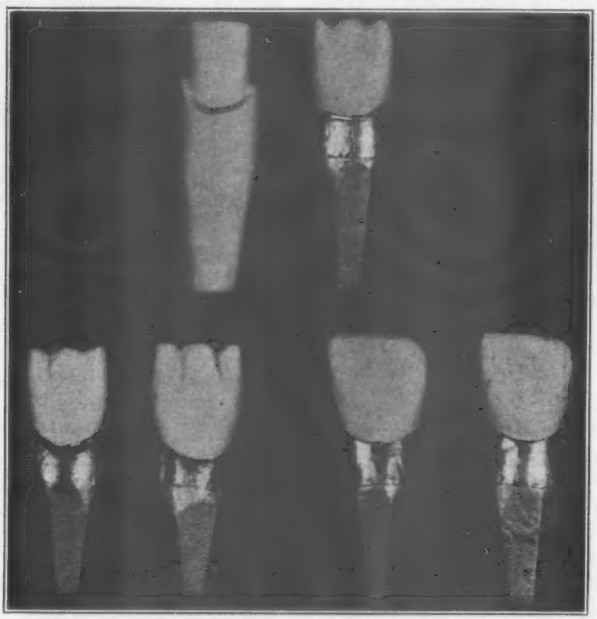


Fig. 9.—The different steps in the construction of the crown.

The temperature is then increased to 2300° F. in five minutes and held at this temperature for five minutes. This permits uniform vitrification. The current is shut off at this time from the porcelain furnace, and when the temperature is approximately 1000°, the porcelain is removed from the muffle. It will be noted that there is a uniform contraction of the porcelain from the shoulder of the platinum matrix.

The crown is then placed on the die and the platinum matrix reburnished. The space caused by the shrinkage of the porcelain is filled with high fusing porcelain. Also, at this time, stains are added where necessary as outlined on the color chart. The crown is then placed in the furnace and fired at the temperature previously noted. It is again removed from the furnace and placed on the die and on the model. With this method, we have absolute control of color distribution because the vitrified body can be changed or altered only by grinding.

If some other method is used, such as the addition of the incisal color to the condensed porcelain previous to firing, thoroughly vibrated into the mold to insure uniform settling of the particles. It is important that no water be removed at this time, lest there be a definite demarcation between the gingival and the incisal colors. If the incisal colors are applied without removal of the moisture, the two colors will be blended, just as an artist in painting a landscape blends the colors of the sky and the landscape at the horizon.

The incisal porcelain is now added and vibration continued until the mold is completely filled. Again vibration should be continued for three minutes or more to obtain uniform settling of all particles of the porcelain. With the vibration still continued, the moisture or hydro-

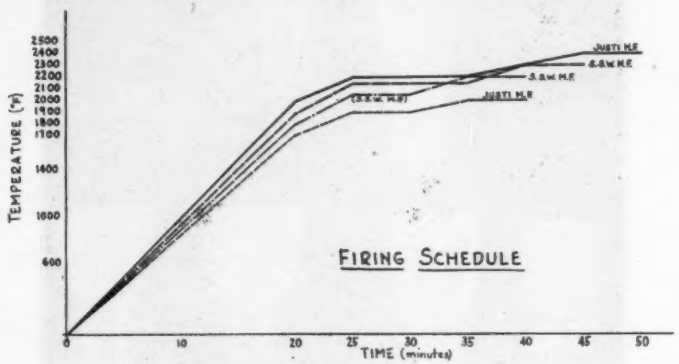


Figure 10.

absorption of water by the condensed porcelain will take place; and by spatulating, whipping or any other method, deformation of the originally condensed model will take place, altering the color distribution.

The vitrified porcelain is placed back on the plaster form. The paper matrix is wrapped around it, and we are then ready for the final condensation and building up of the contour of the tooth. Medium-fusing porcelain and both the gingival and incisal colors are ground in separate agate mortars with agate pestles. The gingival color is then placed incisally as described on the color chart and is scopic water is removed by some absorbent material. This process continues until no more moisture comes to the surface of the condensed porcelain. The paper matrix is removed from around the plaster form of the condensed porcelain, the excess porcelain is removed from the shoulder of the matrix and the crown is placed on the die and in the working model. The crown is now carved to contour and every detail of anatomic form is interpreted in the condensed porcelain. At this time, any irregularities on the labial surface are reproduced. We also interpret in the porcelain any slight unevenness on the labial surface so that,

when the crown is completed, we shall have approximately correct light refraction.

The reproduction of light refraction waves by carving with an instrument is much more satisfactory and gives a far more natural and esthetic appearance in the finished product than that achieved by the use of stones. The condensed porcelain is then removed from the die and model and placed in the muffle. At all times, the porcelain should be placed directly below the thermocouple, which registers the correct temperature of that point in the muffle. The temperature is permitted to increase slowly to 1800° F. At this temperature, the timing of the firing is begun.

The temperature is increased to 2000° F. in five minutes and is held for five minutes at this temperature. The temperature is then increased from 2000° to 2200° F. in five minutes and held there for five minutes. At the termination of this time, and at this temperature, the current is shut off and the furnace permitted to cool to approximately 1000° F., when the porcelain is withdrawn. It will be noted that the porcelain may not have sufficient glaze, but the next and final firing will give the glaze that is desired. The apron of the matrix is then trimmed away to approximately 1 mm. below the shoulder. The crown is then tried in the mouth to determine any change or addition that may be required.

At this time, the surface texture of the adjacent teeth in conjunction with that of the porcelain crown is observed; also the character of the tooth surface, as to whether it gives the impression of brilliancy or somberness. The effect desired can then be obtained by controlling the final firing temperature for the glaze. For instance, if the surfaces of the teeth present brilliancy of character, the final firing temperature is increased sufficiently to obtain this. If the teeth have a somber character, the final firing temperature is below that of the temperature required to obtain a brilliant surface.

The crown is now removed from the furnace and placed on the die. With a clean stone, porcelain is removed from slightly above the shoulder through the matrix on the mesial and distal portions and partly through the matrix on the labial and lingual portions over the shoulder. Thus, it is possible to eliminate the projection of porcelain over the shoulder of the 1/1,000 inch thickness of the platinum matrix.

If it is necessary that additional porcelain for contour or contact be added, it is done at this time. However, before any porcelain is added the fired crown should be worked thoroughly and heated to about 1500° F. It is then placed in the muffle and fired as described for the medium-fusing porcelain. After the completion of the firing or baking, the muffle is permitted to cool to a temperature below 400° F. before removal of the porcelain. This permits the proper annealing of the porcelain crown. The importance of this precaution has been discussed in the early part of this paper.

REMOVAL OF THE PLATINUM MATRIX

The crown is placed in water to facilitate removal of the platinum matrix. With a small serrated tweezer, the platinum is stripped away, first from the margins over the shoulders and always toward the center of the crown. One should avoid tearing the matrix, because tearing makes its removal much more difficult. After the platinum martix has been removed, the inner surfaces of the crown should be etched by means of hydrochloric acid. From the foregoing description of the construction of the crown, it will be noted that I use both high-fusing and low-fusing porcelain. The reasons for this are as follows: 1. To prevent overfusing and oxidation of the first body added by the repetition of firing. 2. To obtain a more nearly accurate finished margin at the shoulder. 3. To prevent

spoiling during repeated firing. 4. To give a more uniform texture to the porcelain.

SUMMARY

From the foregoing discussion and description, it is obvious that the science and art of ceramics are synonymous in the restoration of lost function by means of porcelain. Without this knowledge and the skill of an artisan, to meet esthetic requirements is impossible. A fine art as applied in dentistry cannot be considered a commercial art. It is a creative or applied art and must be taught and considered as such. Delegating this artistic phase of dentistry to a laboratory is placing it in the field of commercial art. The results cannot be any better than those of a commercial artist, who does not have the opportunity to observe existing conditions which are to be interpreted in the restoration. No individual can describe in detail to another his visual observation. It is impossible for the laboratory worker or any one else to create from description. This procedure may be analogous to sending a photograph to a portrait artist and requesting him to paint a colored portrait of the model from the photograph.

This is exactly what the dentist does when sending his porcelain work to the laboratory. It is impossible for the laboratory technician to visualize the minute details of anatomic form necessary to interpretation in a restoration.

It is acknowledged that porcelain is the only material used in dentistry that meets the esthetic requirement for successful reproduction of the natural tooth. Therefore, with the variety of ceramic materials at our disposal, the knowledge of the basic principles of their application and the ability of an artist, esthetic restorations should not be difficult.

450 Sutter St.

BACTERIOLOGIC EVALUATION OF ELECTRO-STERILIZATION

By HARRY ZELSON,* B.S., D.D.S., East Lansdowne, Pa.

THE use of the galvanic current as a therapeutic agent in dentistry is not of recent origin. As early as 1856, we find the dental publications devoting much space to articles describing its use for various purposes. The topics treated in early literature concern its use as an anesthetic for oral surgery, as a cauterizing agent, as an obtundent for sensitive dentin and as a bleaching agent for discolored teeth. Around 1890, its use in treatment of infected root canals was begun. Since then, many men have voiced opinions concerning its value. Most of the evidence presented, however, has been based solely on clinical observation and on subjective opinions. Although clinical observation is an important part of any study, it is insufficient in itself to serve as a basis for definite conclusions, since it is too easy for investigators to allow preconceived notions to influence judgment. In 1931, however, Grossman and Appleton[6] undertook an objective, systematic investigation of the subject. They carried out various experiments to determine the therapeutic merit of the

*Carnegie Fellow, Washington University, School of Dentistry.

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galvanic current, the efficiency of different electrolytes in common use and other associated factors. The work that is being reported here is, to a large extent, a continuation as well as a modification of the work done by the last named investigators.

TABLE 1.—AREA IN WHICH NO BACTERIAL GROWTH TOOK PLACE

	Area in Square Inches					
ZnI_2-I_2	5+ followed by 10−	5− followed by 10+	10+ followed by 5−	10− followed by 5+	15+	15−
0.63 0.72	0.62	0.74	1.13	0.95	1.54	0.68
0.55 0.63	0.88	1.41	1.39	0.75	2.14	0.75
0.59 0.63	0.77	0.95	1.56	0.69	2.41	0.71
No reading	0.49	0.74	1.29	0.53	1.94	0.49
0.59 0.44	0.45	1.02	1.35	0.49	1.35	0.40
0.53 0.53	0.76	1.23	1.47	0.49	2.14	0.54
0.41 0.40	0.48	0.65	0.70	0.40	1.37	0.36
0.40 0.44	0.41	0.74	0.71	0.44	1.19	0.40
0.40 0.22	0.23	0.65	0.67	0.31	1.25	0.36
0.27 0.28	0.48	0.65	0.67	0.40	1.58	0.48
0.87 0.97	0.88	1.15	1.21	0.83	1.70	0.75
0.95 0.82	0.99	0.85	1.56	0.76	1.35	0.72
0.53 0.82	0.83	0.95	0.76	0.54	1.70	0.69
0.24 0.35	0.49	0.50	0.67	0.28	1.27	0.48
0.57 0.64	0.85	1.35	1.37	0.80	2.35	0.82
	Averages					
0.55	0.61	0.90	1.10	0.58	1.69	0.58

The two readings in the ZnI_2-I_2 column for each series are self-explanatory when one views the photographic imprints (Fig. 1).

SERIES A (FIG. 1)

The first series of experiments were conducted to determine whether there was any bactericidal value in permitting one electrode to act on an area in various sequences with the electrode of opposite charge, and, if so, the time intervals that would prove most satisfactory.

Method.—Ten cubic centimeters of nutrient agar in each of four test-tubes was heated to liquefaction and cooled to 45° C. To each tube was then added 0.5 cc. of a 24-hour broth culture of bacteria obtained from infected root canals.

To assure an even dispersion of the micro-organisms, the tubes were shaken slightly. The contents of each tube were then poured into separate sterile 10-cm. Petri dishes. The agar was allowed to harden and two points 2 inches apart were marked on each plate. Upon each of these points was placed a loopful of electrolyte with a 1-mm. platinum wire loop. The electrolyte used was ZnI_2 $\frac{M}{1}$-I_2 $\frac{M}{10}$. This electrolyte was chosen because of definite advantages ascribed to it by Grossman and Appleton in their studies.

Table 2.—Area of Bactericidal Effect in Square Inches

Interpolar Distance Inches	Series No. 1	Series No. 2	Series No. 3	Averages
3+	1.76	2.16	1.96	1.89
6+	1.96	1.41	2.17	1.82
9+	2.03	1.74	1.84	1.87
3−	0.65	0.71	0.64	0.67
6−	0.75	0.72	0.77	0.74
9−	0.82	0.68	0.71	0.73

Control

	3	6	9	
ZnI_2-I_2	0.67 0.63	{0.71 {0.73	{0.60 {0.68	0.67

Plate 1 (Fig. 3) was set aside to show the effect of the electrolyte without any electrolysis.

Plate 2 (Fig. 4) was treated as follows: The positive electrode was placed on one of the points treated, and the negative on the other. A galvanic current of 2 ma. was maintained for five minutes. Then the electrodes were reversed. The current was again maintained at 2 ma., this time for ten minutes. The total treatment consisted of 30 ma. minutes, which has arbitrarily been accepted as one treatment unit by most clinicians.

Plate 3 (Fig. 5) received the same general treatment as Plate 2. However, the initial period of application of the 2 ma. current was ten minutes, followed by a second period of five minutes after reversal of the electrodes.

Plate 4 (Fig. 6) was treated with the positive and negative electrodes at the points marked for fifteen minutes with a 2 ma. current. In this case, the electrodes were not reversed.

The four plates were incubated at 37° C. for twenty-four hours, after which the area in which no growth of bacteria took place was measured carefully and recorded both in chart form (Table 1) and on photographic paper (Figs. 3 to 6). This experiment was repeated through fifteen series, or sixty plates.

Table 3.—Bacterial Growth*

Tube	ZnI_2-I_2				ZnI_2-I_2 plus Negative Electrode				ZnI_2-I_2 plus Positive Electrode			
	Series 1	Series 2	Series 3	Series 4	Series 1	Series 2	Series 3	Series 4	Series 1	Series 2	Series 3	Series 4
1	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+
3	+	+	+	+	+	+	+	+	+	−	+	−
4	+	+	+	+	+	+	+	+	−	−	−	−
5	+	+	+	+	+	+	+	+	−	−	−	−

*+ = bacterial growth; − = no bacterial growth.

Results.—The results of these series

showed conclusively that (1) the negative electrode had little or no bactericidal value, while the positive electrode was definitely effective, and (2) the bactericidal effect was directly proportional to the time of application of the positive electrode.

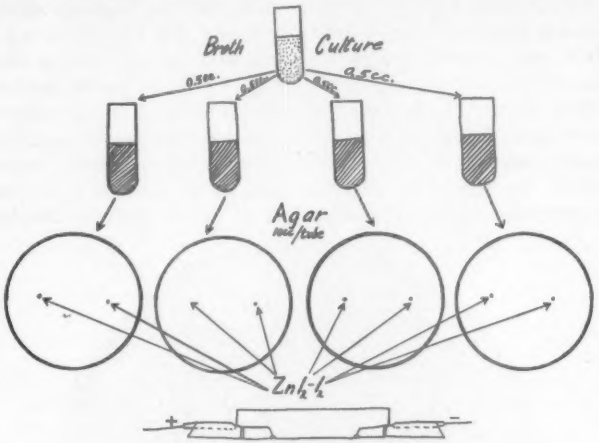

Fig. 1.—First series of experiments.

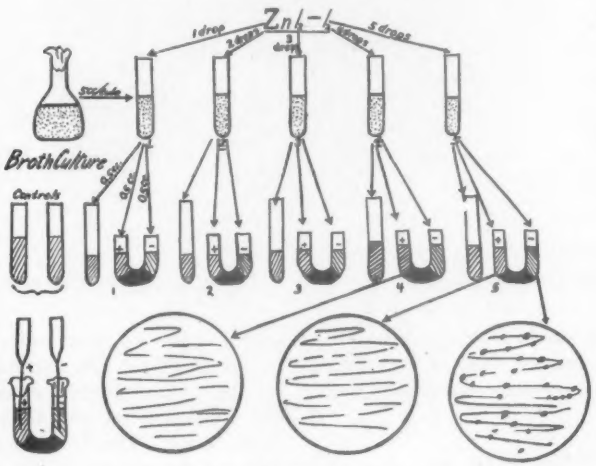

Fig. 2.—Third series of experiments.

SERIES B

Several of the early plates in Series A seemed to show a bactericidal effect in the interpolar region. On the assumption that this effect, if it existed, would be more discernible if the distance between electrodes were varied, a second series of experiments were carried out.

Method.—Pyrex pie plates 12 inches in diameter were used in place of Petri dishes and pour plates made as in Series A. One cubic centimeter of broth culture of the pathogenic micro-organism was added to 50 cc. of nutrient agar per pour plate. Points were marked on the plates in series of three: 3 inches, 6

inches and 9 inches apart. A 1-mm. loopful of electrolyte was deposited at each point and the electrodes were placed therein. A current of 5 ma. was applied for six minutes (total 30 ma. minutes). The plates were incubated at 37° C. for twenty-four hours and the area of bactericidal effect was measured and recorded. (Table 2.)

Results.—The areas of bactericidal effect did not seem to depend in any way on the interpolar distance. There was no interpolar effect, growth being just as dense in the interpolar region as in other parts of the plates. The positive electrode was definitely more effective than electrolyte alone, while the negative was not.

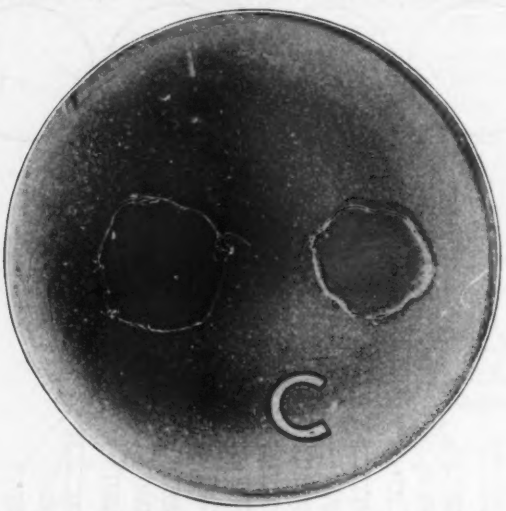

Fig. 3 (Plate 1).—Control plate. ZnI_2-I_2 at each point; no electrolysis; average area, 0.55 square inch.

SERIES C (FIG. 2)

To further evaluate the effect of electrosterilization, a third series of experiments were carried out. Five cubic centimeters of broth culture of the pathogenic bacteria was placed in each of five numbered test tubes. One drop of the ZnI_2-I_2 solution was added to tube 1; 2 drops to tube 2; 3 drops to tube 3; 4 drops to tube 4, and 5 drops to tube 5. The tubes were allowed to stand for thirty minutes to permit antibacterial action of the drug. Then, 0.5 cc. of the contents of tube 1 was added to 5 cc. of sterile molten nutrient agar (45° C.) in a sterile test tube, and 0.5 cc. to each arm of a U-tube, each of which also contained 5 cc. of sterile nutrient agar. The mid-portion of the U-tube was blocked with hardened dense agar to prevent the interchange of material between the arms and, at the same time, to permit passage of an electric current. Similar procedures were carried out with tubes 2, 3, 4 and 5. In addition, two control tubes containing 5 cc. of nutrient agar were made, one contaminated with bacteria and the other sterile. The U-tubes were treated with a 5 ma. current for six minutes with a positive electrode in one arm and a negative in the other. All tubes were incubated for twenty-four hours at 37° C. and then examined for the growth of colonies. Where there appeared to be no visible growth, a streak plate was made in order to determine whether bacterial life was present. In making the inocula-

Fig. 4 (Plate 2).—+, positive electrode, five minutes; negative electrode, ten minutes; average area, 0.61 square inch. —, negative electrode, five minutes; positive electrode, ten minutes; average area, 0.9 square inch.

Fig. 5. (Plate 3).—+, positive electrode, ten minutes; negative electrode, five minutes; average area, 1.1 square inches. —, negative electrode, ten minutes; positive electrode, five minutes; average area, 0.58 square inch.

tion for the streak plate, the inoculating loop was placed in the stab left by the electrode. No attempt was made to find the exact distance of sterility surrounding each effective electrode stab, since this was beyond the scope of the present investigation.

Results.—In no case was the drug

alone, in the quantities here used, sufficient to destroy all bacterial life.

The negative electrode was just as ineffective as the drug alone.

The positive electrode did exert a bactericidal effect in the tubes having a higher concentration of electrolyte. The results are shown in Table 3.

The conclusions reached from these experiments* show that the positive electrode has definite bactericidal properties, while the negative electrode appears to be of no value, at least not at the strength of current herein used, which is approximately the amount used in practice.

Fig. 6 (Plate 4).—+, positive electrode, fifteen minutes; average area, 1.7 square inches. —, negative electrode, fifteen minutes; average area, 0.58 square inch.

These results seem to confirm the belief that the effect of the direct current is due to products liberated at the positive pole, in this case nascent I_2 and Cl_2 (the Cl_2 being present in the broth and also in the body fluid when used *in vivo*). It is likely also that the positive electrode serves to draw to itself the bacteria which are negatively charged under ordinary conditions and hence brings them within the effective range of the products there liberated. All in all, these results add to the previous evidence that electrosterilization is effective if the positive electrode is used within the root canal of the tooth treated.

*Conclusions based on the use of the ZnI_2-I_2 electrolyte. There *is*, of course, the possibility that different results would be obtained with other electrolytes.

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900 Pembroke Ave.

A COMPLETE IMMEDIATE DENTURE TECHNIC FOR THE GENERAL PRACTITIONER

By WILLIAM W. HURST,* D.D.S., Cleveland, Ohio

IMMEDIATE denture service has become a routine procedure in many offices. In the past ten years, scores of articles on the subject have appeared in the literature; some varying with others only as to technic and materials used.

This type of denture service is not new, having been practiced for at least thirty years in some modified form, such as temporary replacements preliminary to fixed bridgework.

The advent of colloidal impression materials and the new denture resins has stimulated new interest in this field and has given rise to increased study of the problems involved and to the perfection of successful simplified methods of wide application.

The public has been quick to subscribe to this form of replacement of lost natural teeth because of its many advantages. There seems, however, to be some apathy on the part of the general dentist toward adopting the immediate denture phase of modern prosthesis. There possibly are many reasons for this apparent lack of interest, but, no doubt, the natural disinclination of most of us to try anything "new" is the most important one.

Immediate denture service may have the following subdivisions:

A. Preextraction records.
1. X-ray films.
2. Study models.
3. Profile registers.
4. Facial measurements.
5. Photographs.
6. Molds and shades of teeth.
7. Charts of fillings, stains and enamel checks present in anterior teeth.

B. Consideration of related factors in planning procedure.
1. Single upper immediate or single lower immediate denture made to occlude with natural denture, complete artificial denture or partial denture in opposite jaw.
2. Necessary restoration of natural teeth that are to remain in mouth.
3. Type of partial denture to be made for opposing jaw.
4. Determination of amount of bite opening necessary.
5. Extraction of posterior teeth.

C. Impressions.

D. Registration of occlusion.

E. Tooth selection.

F. Trying-in of posterior teeth.

G. Trimming of cast and setting of anterior teeth.

H. Staining, filling and grinding of anterior teeth.

I. Processing of the denture.

J. 1. Extraction of anterior teeth and surgical preparation of ridge.
2. Use of transparent surgical matrix.

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Read before the Section on Full Denture Prosthesis at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

K. Placement of denture or dentures.

L. Instructions to patient and postoperative care.

M. Servicing and refitting of the denture.

As there are available many excellent articles on the various phases of immediate denture service covering several successful technics, I shall deal only with points wherein the technic presented differs from others, or with details that require further emphasis.

PREEXTRACTION RECORDS

Preextraction records serve as valuable sources of reference whether one wishes to reproduce exactly the conditions existing in the natural dentition and facial profile or intends to modify these conditions somewhat.

Fig. 1.—Profile register made from photograph before bite was opened.

Opinions differ as to the desirability of duplicating marked irregularities in tooth positions and the many fillings, checks and stains found in natural teeth. In my experience, most patients prefer a compromise between the exaggerated conditions often found in mouths and the more nearly ideal conditions found in the perfect natural dentition.

Owing to the early loss of teeth, many bites have closed beyond the normal position.

When photographs are to be taken, and profile measurements and profile registers are to be made, it is recommended that this be done both before work is begun and again when the bite has been opened to the desired degree by means of wax or compound bite-rims. (Figs. 1 and 2.)

The corrected profile register and measurements, as well as the photographs, will then serve as more or less permanent guides when, because of resorption of the supporting tissues, it becomes necessary to rebase or remake the denture or dentures.

CONSIDERATION OF RELATED FACTORS IN PLANNING PROCEDURES

Since immediate dentures require occlusal balance for their success, they should be antagonized by a full or nearly full complement of natural or artificial teeth, or a combination of the two.

Fig. 2.—Profile register made after bite was opened to required degree.

A full upper denture should not be placed in a mouth if the only occluding lower teeth are the anterior. The reasons for this are obvious. When the full upper denture is of the immediate type, the region newly operated upon is in the anterior part of the mouth. If the only occluding lower teeth are the anterior, not only will the upper denture be displaced by the tooth contact, but also the unhealed anterior ridge will, from the

undue pressure it receives, tend to resorb rapidly, and will not be permitted to mold itself to the desired, predetermined form.

When the placement of a single immediate denture is considered, the entire problem of mouth restoration should be studied. If a full complement, or nearly full complement, of natural teeth are to remain in the opposite jaw, these teeth should receive the necessary repair. If several natural teeth, especially posterior teeth, are missing in the opposite jaw, they should be replaced. If a full denture is needed in the opposite jaw, it should be made at the time that the immediate denture is made and both dentures be placed in the mouth at one sitting.

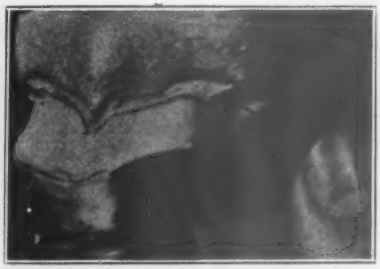

Fig. 3.—Front view of model showing way an ordinary stock tray would fit case of this type.

Fig. 4.—Side view of model in Figure 3.

In making preparations for the construction of an immediate denture, consideration must be given to the procedure to be followed in the extraction of the remaining teeth. Usually, all posterior teeth, with the exception of a single bicuspid, which is useful in maintaining occlusion, are extracted four or five weeks before the impression is taken. With this method, when only the anterior group of teeth remain, a more accurate impression can be obtained with greater ease; the posterior part of the mouth will be rather well resorbed, providing a more stable foundation for the denture, and the shock of the extraction of the remaining teeth preliminary to the placing of the denture will be greatly lessened.

IMPRESSIONS

Impressions for immediate dentures must be accurate. Every rule applicable to taking an impression of an edentulous mouth applies to taking an impression for an immediate denture. Since the presence of teeth somewhat complicates the taking of a full impression from which a complete denture is to be constructed, many methods to overcome this difficulty have been devised.

Full plaster impressions, the Supplee[1] sectional compound technic and other sectional compound types, sometimes combined with the use of plaster of Paris, have been employed.

In the past six years, the use of colloidal impression materials, when properly handled, has proved very successful for producing accurate impressions.

An important factor in obtaining a good impression is, first of all, an accurately fitting primary tray with which to carry the impression material to place. Most stock metal trays, including colloidal impression trays, have to be lengthened at the heels, built up in the palate or added to on the flanges by means of wax or compound before they can be successfully used for impressions for immediate denture cases. Since these additions of materials add bulk to the tray, tend to displace soft tissue and, in

the case of colloidal impressions, act as insulators and interfere with cooling, it can be readily seen that it is with difficulty that even a fair impression is obtained.

Most average cases can be fitted fairly well with the newer water-cooled impression trays. Occasionally, a case will present itself which no stock tray will even approximately fit. (Figs. 3 and 4.) For these cases, I construct my own water-cooled trays, as follows:

1. An accurate snap impression is secured with muscle trimming and the model poured in plaster or stone.

2. The denture border outline and anterior margin of the postdam area are penciled on the model. With the point

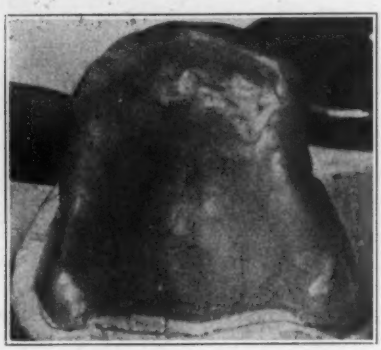

Fig. 5.—Study model with one thickness of base-plate wax adapted. The postdam area is not covered with wax.

of a knife, a cut is made in the model along the line representing the posterior border.

3. One thickness of base-plate wax is adapted over the model, trimmed to the border outline and anterior margin of the postdam area and luted to the model. (Fig. 5.) Because of the addition of this wax, the finished tray will be slightly larger than the model.

4. By means of colloidal impression material and a duplicating flask, duplication is made in investment of the model with wax attached.

Removal of the model from the duplicating impression is facilitated by previously making an undercut depression one-eighth inch deep and one-quarter inch in diameter on the under side of the cast. While a wood screw is held in this depression, low-fusing metal is poured into the depression around the screw, which is then removed and duplication continued. When ready to remove the model, the operator inserts the screw and uses it as a handle.

5. With the fingers, an annealed seamless copper tube, three-thirty-seconds inch outside diameter and one-sixteenth inch inside diameter is adapted to the investment model. The ends are allowed to project 2 inches ahead of the model. (Fig. 6.)

6. Two pieces of brass tubing three-

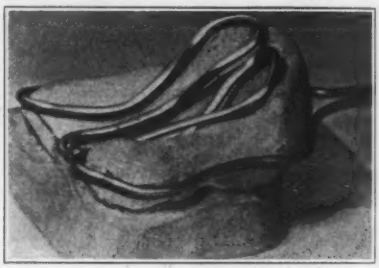

Fig. 6.—Embossed investment model with copper tubing adapted.

sixteenths inch outside diameter and three-thirty-seconds inch inside diameter are cut approximately 2 inches in length. One end of each tube is beveled and two circular grooves are cut in the other end of each tube.

7. Brass tubes are slid over the ends of the copper tube so that the grooved ends of the brass tubes are in contact with the first bends of the copper tube, which should extend beyond the brass tubes or be flush with them.

8. The copper tubing is laid aside and one thickness of 22-gage wafer wax is closely adapted to the investment model, covering the embossed portion and postdam area. The wax is trimmed to the

edge of the embossed portion of the model around the peripheries and to the groove representing the posterior border of the denture outline. The posterior portion of the inside of the finished tray will thus be raised and will serve as a postdam in taking the impression. The edges of the wax are luted to the model.

9. The copper tubing is heated slightly and pressed to place on the wax. The tube is luted to the wax. A handle is added to the tray by applying one thickness of base-plate wax over the posterior one-third of the brass tubes and attached to the wax covering the model. A flat piece of wax is attached to each buccal flange just anterior to the tuberosity and

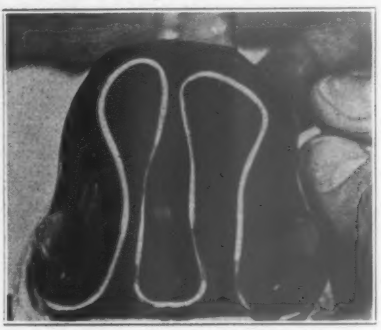

Fig. 7.—Model, with one thickness of 22-gage wax adapted over embossed portion and over postdam area; copper tubing luted to wax; handle and posterior finger rests waxed to place.

midway between the periphery and the bottom of the tray. These horizontal projections, when cast with the tray, will serve as convenient finger rests and facilitate the removal of the impression from the mouth. (Fig. 7.)

10. New base is added to the model, extending the borders one-half inch laterally, anteriorly and posteriorly, and the crevice below the periphery of the wax is filled in. A groove is made in the middle of the border all around the model.

11. Separating medium is applied to all exposed parts of the model; the model is boxed with wax, and investment is poured into the boxing, covering the waxed portion completely.

12. The mold is placed in a pan of cold water and heated moderately.

13. The two halves of the mold are separated and the wax is flushed out.

14. Two round gates one-quarter inch in diameter are cut in the heel of the mold, one at each tuberosity, extending into the space left by the pattern. Gates should be made by semicircular grooves in each half of the mold.

15. The halves of the mold are flushed out and placed together and the edges sealed with investment.

16. The mold is dried out and placed in any container that will hold it in an

Fig. 8.—Front view, showing fit of finished tray.

upright position with the gateways at the top.

17. Four ingots of low-fusing tray metal are melted and poured into one of the gateways until the metal comes to the top of the other gateway. The mold is allowed to cool for at least fifteen minutes before opening.

18. Sprues are cut off with carborundum disks and edges are smoothed with a vulcanite bur, vulcanite scraper and sandpaper disks.

19. A three-sided spear-shaped drill is made by cutting the sides off of a No. 560 bur H. P.

20. Holes are drilled through all parts of the tray approximately three-thirty-seconds inch apart. All holes are started

from the tube side of the tray to prevent puncturing the tube.

A tray constructed in this manner fits the mouth accurately (Figs. 8 and 9), requires a minimum amount of impression material and aids in the production of a satisfactory impression. It is inexpensive and can be made easily, by the dentist, the technician or the office girl.

In using the tray, rubber tubes are placed on the projecting brass tubes and a connection is made with the water supply of the unit. Ice water is more effective. The water can be drawn through the tray by attaching one rubber tube to the saliva ejector while the other tube is placed in a pan of water, or an irrigating receptacle can supply the water by the force of gravity.

Because of the small amount of impression material used and the excellent conductivity of the metal, rapid complete cooling occurs almost immediately, about one pint of ice water being sufficient to thoroughly chill the impression. (Fig. 10.) I have used other excellent impression technics with good results: the compound-plaster method (Fig. 11) developed by Carl O. Flagstad,[2] of the University of Minnesota; the compound-colloid (Fig. 12) method devised by G. H. Droegkamp,[3] of Milwaukee, Wis., and the compound oil paste method advocated by Merrill G. Swenson,[4] of the New York College of Dentistry.

Fig. 9.—Side view of tray shown in Figure 8.

REGISTERING OCCLUSION

Regular occlusal bite-rims attached to shellac or vulcanite base-plates should be used in registering occlusion. Mush bites of beeswax are likely to lead to an incorrect bite since they are difficult to control. Care must be taken in the effort to secure true centric relation, because many patients, owing to early loss of teeth, have acquired, over a long period of time, an anterior functioning position of the mandible which is not the normal bite. The opening and closing or fatigue method of taking the bite proves satisfactory in most cases.

TOOTH SELECTION

Existing methods of tooth selection applicable to other phases of prosthesis apply to the selection of teeth for immediate denture work. When an examination of ridge relationship reveals an abnormality, cross-bite teeth or other variations of anatomic teeth should be selected to suit the needs of the case.

Fig. 10.—Colloidal impression taken in water-cooled tray.

TRYING IN THE TEETH

As a final checkup on the centric relation, the posterior teeth should be set up on the occlusal rims and tried in the patient's mouth.

TRIMMING THE CAST AND SETTING THE ANTERIOR TEETH

There are three methods of procedure in vogue for trimming the cast and setting the teeth: the one in which every other tooth is removed from the cast and

the corresponding tooth set in place; one in which the three anterior teeth of one side are removed and the porcelain teeth are set (Figs. 13 and 14), and a third method, in which all the anterior teeth are cut off and the six anterior teeth are set up.

Very often, when existing positions of the natural teeth require alteration, as when the median line is off center, the teeth protrude anteriorly or extend too far below the lip, I prefer the three-teeth-at-a-time method. However, if the natural tooth positions merit exact or slight modification in replacement, the every-other-tooth method is desirable. The trimming of the ridge of the cast can be done much more easily when the three-teeth-at-a-time procedure is followed. A duplicate cast should always be available for comparison and measurement.

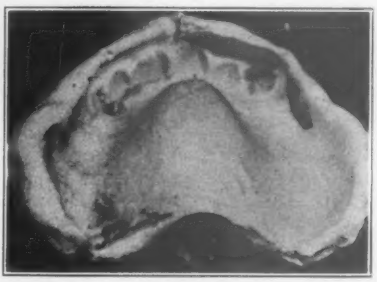

Fig. 11.—Completely assembled compound-plaster impression.

STAINING, FILLING AND GRINDING ANTERIOR TEETH

Many patients desire an exact duplication of the natural teeth in a denture. It is possible with modern facilities to reproduce faithfully in the artificial teeth all of the markings, irregularities, restorations, etc., that exist in the natural teeth. However, there are those patients who prefer that no attempt be made to duplicate the stains, checks, fillings, etc., and so the use of this service would depend on the case in hand.

PROCESSING THE DENTURE

Since I construct most immediate dentures with a labial flange, I use as a denture base material the acrylic resins in preference to vulcanite. The denture should be as light as possible for the strength necessary, and the labial flange should be extremely thin.

EXTRACTION OF ANTERIOR TEETH, SURGICAL PREPARATION OF RIDGE AND USE OF SURGICAL MATRIX

A local anesthetic is preferred for extraction of the anterior teeth and preparation of the ridges so that the dentist can devote his entire attention to the operation. He does not feel that he has to hurry and the field is easier to work in since the blood flow is materially lessened as compared to that present under a general anesthetic. To facilitate extraction of the teeth and minimize the possibility of fracture of the thin labial plate, it is recommended that the mucoperiosteum be reflected and the margin of thin bone covering the necks of the teeth be removed preliminary to the extraction.

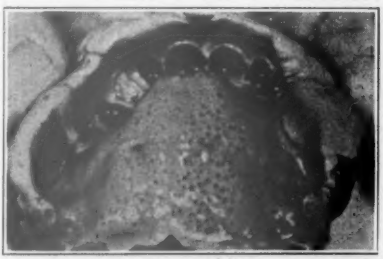

Fig. 12.—Completed compound-colloidal impression.

Since it is usually only necessary to trim the lower third of the labial plate and septa in upper cases and the upper third of the labial plate and septa in the lower cases, caution should be observed that only a minimum of bone be removed before trying in the denture or transparent surgical matrix. More bone

can then be trimmed off if necessary to permit a proper seating of the denture. The edges of the gum tissue should be trimmed and approximated, after which several loosely drawn sutures may be placed.

PLACEMENT OF DENTURE

The denture should be inserted immediately after the suturing. A check is made at this time to see that peripheries are the right height, that frena have been provided for, that the posterior border is not extending onto the soft palate and that the occlusion is balanced. If a partial or full denture is to be placed in the opposite jaw, it should be inserted at this time also. If the immediate denture does not stay in place, an adhesive

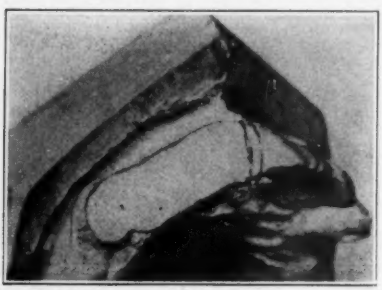

Fig. 13.—Three teeth removed from model and ridge prepared.

powder should be sprinkled lightly on the posterior palate area.

INSTRUCTIONS TO PATIENT AND POST-OPERATIVE CARE

The patient should be instructed to leave the denture in the mouth continuously for twenty-four hours and not to take it out during that time even to clean it. An appointment for the patient to return at the end of this period should be made at the time of the insertion of the denture. Ice packs should be applied to the face for periods of ten minutes, with a five-minute interval between applications. When the patient returns, the dentist should remove the denture and carefully swab the mouth with a bland solution, such as that recommended by J. P. Henahan:

Iodine 128 grains
Potassium iodide 256 grains
Oil of gaultheria 64 minims
Glycerine q.s. 1 quart

The blood clot within the incision should not be disturbed. Any area of pressure should be noted and the denture trimmed accordingly. The patient may then be instructed in the placement and removal of the denture for the purpose of cleansing it and rinsing the mouth. One-half teaspoonful of salt in a glass of tepid water is a satisfactory mouth rinse. The sutures may be removed between three and four days after placement, the

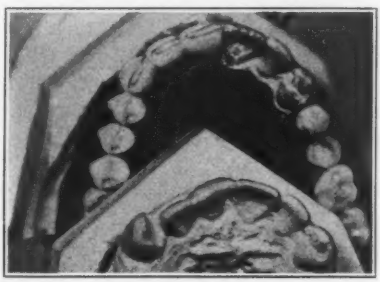

Fig. 14.—Corresponding three anterior teeth waxed to place and compared to duplicate model.

time depending on the progress of healing.

SERVICING AND REFITTING THE DENTURE

Immediate dentures placed in a mouth from which posterior teeth were extracted a month or more previously require surprisingly little attention for the first two months or so, relief of the peripheral borders and deepening of the relief area as resorption takes place being the only alterations usually necessary. Careful examination of the occlusion should be done routinely whenever the patient returns for an adjustment. When the denture becomes loose, one of the oil pastes

can be periodically placed in the region of the greatest resorption, which is usually the anterior region, and the patient can continue to wear the denture for several months with comfort and success. Later, the denture can be duplicated in conformity with the originally established profile, and this process can be repeated until resorption ceases, which is usually a year and a half after extraction.

CONCLUSION

Immediate denture service is of distinct advantage to the patient. A denture of this type constructed according to a careful technic and placed in the mouth immediately after extraction protects the blood clot and molds the ridge to a predetermined form. It permits the patient to engage in public affairs almost without interruption and accomplishes for the patient the transition from natural to artificial dentition without the difficulties that are usually encountered when the teeth are extracted and a prolonged waiting period is endured before the denture is made.

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DIAGNOSIS, PROGNOSIS AND RECORDS PRELIMINARY TO THE CONSTRUCTION OF DENTURES

By O. M. DRESEN, D.D.S., Milwaukee, Wis.

MODERN dentistry has a new conception of denture service. The dentist of today no longer injudiciously extracts and then attempts to construct dentures. Denture service of the present time requires diagnosis, preparation of the ridges and the use of preextraction records, so that a complete service can be rendered to the patient, thus taking the construction of dentures out of the mechanical field and placing it in its proper position in dentistry as a health service. To the patient and the public, there is due the best possible service that we as a profession can render, and if we, the dental profession, wish to keep this phase of dentistry in its proper place and prevent it from being controlled by commercial interests, we must render such service.

The construction of dentures has too long been a rather hit or miss affair. The patient's teeth were extracted, and after an indeterminate time of from a month to a year, dentures were constructed. Today, with the use of proper surgical procedures, and since the advent of the immediate denture, such methods should no longer be used, although, sad to say, they are still in vogue with many dentists and in many localities.

It was, and in some places still is, considered good practice not to construct dentures until the patient has gone edentulous for from six months to a year, to permit proper healing and shrinkage

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of the ridges. However, it seems to be a fact that mouths in which dentures are placed immediately after the extraction, seem to have, and to maintain, good ridges. In many cases, these mouths seem to build ridges to conform to the denture rather than to shrink away from it. As all dentures should be relined or remade as required by mouth conditions and a changing appearance, it is advisable to insert dentures immediately after the removal of teeth or as soon thereafter as possible. The patient of today is demanding this type of service. In the past, one of the main reasons that many persons retained teeth much longer than was advisable was their reluctance to pursue business and social activities while edentulous, and during the period of healing. The old theory regarding waiting for "shrinkage" to occur in order that a so-called permanent denture could be constructed has proved a fallacy.

Three conditions govern the selection of a patient for the immediate type of replacement: 1. The desire of the patient to have this type of denture, and the knowledge that the patient will appreciate the service and will fully cooperate by constant wearing of the denture and the acceptance of minor difficulties. 2. The amount of infection in the mouth. It would not be logical to attempt to insert a denture when a great deal of oral infection was present, because of the complications that might ensue; or to attempt to construct a denture for a mouth in which, because of infected areas, radical surgical measures might be necessary. 3. The age of the patient and state of physical and oral health.

In all prospective denture cases, a careful study of the mouth should be made. Roentgenograms not only of the remaining teeth, but also of any edentulous areas are, of course, essential in every case. These roentgenograms will disclose the condition of the teeth and the supporting tissues. The amount of bone destruction will accurately indicate the amount of resorption that may be expected in any individual case. The deeper the pockets and the greater the amount of bone involved, the more rapid the resorption and the greater the destruction of ridge surface. Many times, teeth are retained too long, a condition resulting that can be corrected only after many years and much difficulty in the wearing and servicing of dentures. In these cases, much bone is destroyed or diseased, some of which can be removed surgically when the mouth is prepared. However, under dentures, this type of mouth changes rapidly. Natural processes may take a year or longer to remove all of the diseased alveolar tissue, requiring frequent adjustments, relining and even the construction of new dentures before the cycle is completed.

Many times, the question arises as to the advisability of retaining a few teeth and placing a partial denture. This is especially true of the lower anterior teeth. When the teeth, with the tissue surrounding the teeth, are in a normal, healthy condition, their retention and a partial restoration may be advisable. However, if the condition of the tissues surrounding the teeth is questionable and if the retention of the teeth is only a matter of a short time, they had better be removed. This is especially true if the general health is involved or if there is a possibility that the retention of such teeth may result in further destruction of the lower ridge.

There is, of course, always the possibility that the retention of lower anterior teeth will result in destruction of the upper anterior ridge and the replacing of that ridge by loose flabby tissue. Many times, this is true, even if the lower partial and the upper denture are apparently well and correctly constructed, because of the tendency of such patients to masticate on their anterior teeth. Such a tendency should be corrected through instructions to the patient or by the removal of all incisal contact or the con-

struction of a full lower denture if the habit persists.

The practice of placing an upper denture against remaining lower anterior teeth is also inadvisable, because of the stress placed on the upper anterior ridge, causing destruction of bone and a flabbiness of the ridge. If such anterior teeth are worth retaining, a partial denture should be constructed. If they do not warrant the cost of the construction of a partial denture, they should be removed and a lower denture be constructed.

The prognosis of any case is only as good as the ridge conditions of that particular case, and if we can, through sound, careful planning, conserve and maintain ridges through the construction of dentures or by the extraction of remaining teeth, we will have provided an effective health service.

Let us assume that a patient presents himself for examination prior to extraction of the remaining teeth, and consider the proper procedure for such a case.

Full mouth roentgenograms have been taken, and after an examination of the mouth and study of the roentgenograms, it has been decided to remove all remaining teeth.

Next to be considered are preextraction records and preparation of the ridges. The preextraction records that are desirable for imitating and maintaining facial expression are: (1) photographs, (2) facial measurements and (3) impressions and shades of the natural teeth with registration of centric occlusion.

The selection of shades taken from the natural teeth before extraction, with the use of either the extracted teeth or the casts of the natural teeth in the selection of shades and molds, is the only correct method. It also makes the operator a keener imitator in cases wherein no records are available and teeth are selected with an effort to create harmony between face form and tooth form.

Today, with modern equipment, photographs are easily taken in any office and bulky and cumbersome equipment is no longer necessary. All that is required is a fairly good camera of any size and two photoflood lamps. If pictures of a definite size are desired, an ordinary 6-inch ruler is placed on the same focal plane as the face of the patient and the original negative is magnified so that the ruler will measure 3 inches in the enlarged picture, for a half-size reproduction, or 6 inches for a full-size reproduction.

Photographs that the patient may have in his possession are often of great value. These may be anything from kodak snapshots to photographic portraits. They will often be valuable as guides in restoring facial outline and contour, and in determining tooth position and arrangement.

If photographs are taken, the following positions are suggested:

1. Front view with teeth in contact and lips in repose.

2. Front view with lips parted and teeth in occlusion. This will show the relation of the upper teeth to the lower, amount of overbite and overjet and the size, shape and position of the individual teeth.

3. Front view, lips parted and teeth parted. This photograph of the incisal and occlusal alinement is of great help in arranging and altering the artificial teeth to imitate the natural dentition. It can be used in the laboratory as a guide and at the chair for comparison.

4. Profile with lips closed and teeth in occlusion. Two pictures can be made from this one negative: a half size one to study the profile and facial contours and a full size one which, after stiffening with cardboard, can be cut out, forming a template that will accurately fit back on the face. The vertical dimension with the trial dentures in place must be opened enough to cause a slight embedding of the template in the tissues of

the chin to allow for the immediate settling of the finished dentures.

5. Profile with lips parted and teeth in occlusion to show the labial inclination of the incisors and the overbite and overjet. If it is enlarged to full size and a cut-out is made, it can be used as a template to locate the incisal line. Facial measurements should be taken and recorded whether or not photographs are taken. The following measurements are made:

(a) The distance from the base of the nose to the tip of the chin with the teeth in occlusion. An ordinary celluloid ruler may be used, or a measuring device using the bridge of the nose as a fixed point.

(b) Distance from the base of the nose to the mesio-incisal line of the upper central incisors.

(c) Distance from the tip of the chin to the mesio-incisal line of the lower central incisors.

(d) Approximate amount of overbite and overjet.

Now upper and lower impressions are taken in a hydrocolloid impression material and poured in stone. A centric occlusion registration is taken so that, if necessary, the case can be mounted on an articulator to aid in determining ridge relationship.

With the making of all of these records, the operator will tend to become a keen imitator and better observer in cases in which no records are present or available. These records also have a psychologic value that is perfectly obvious. They make for a closer relationship between the dentist and the patient and will prevent the patient from drifting away from the dentist who has made the records, because the patient will realize that this dentist can construct better dentures than some one who has no records and has possibly not even seen him before his teeth were removed.

In many cases, the relation of the ridges to each other is obviously normal; there is sufficient room for the placing of the artificial teeth, and, in the removal of the teeth, all that is necessary is a smoothing of the ridges.

Other cases present a very different problem: The relationship of the ridges is very bad, large undercuts are present and the ridges are too prominent for a pleasing appearance. In these extreme cases, it is well to make duplicate casts of the original preextraction record casts and mount these on an articulator. The teeth can then be cut off with a sharp knife, the ridge relationship improved and heavy bulky ridges trimmed so that teeth can be set to have a pleasing appearance. In such an abnormal mouth, usually one side of the upper and lower ridges is trimmed to make a possible comparison with the untrimmed side to determine how much has been removed. These mounted casts are then used as a guide in the preparation of the mouth; or the entire casts can be prepared and transparent base-plates be constructed to be used as splints in the reduction of the ridges. These base-plates are easily and quickly made, from the transparent acrylic base material. They can be made heavy enough that pressure can be used in seating them, with no distortion, and they will fit as accurately as any denture. Made in this manner, they are better and more satisfactory than any other yet devised for a similar purpose.

Care should be taken in the preparation of these ridges to conserve as much alveolar bone as possible and only to remove as much as is necessary. The ridge should be well rounded from the labial and buccal aspect toward the lingual crest. Care should be exercised not to get the ridges too thin lest resorption make them sharp and knifelike. In the case of the upper, care must be used not to encroach on the nerve and blood supply to the lingual portion of the crest of the ridge. Damage here will result in soreness for a considerable period and, in many cases, will cause a burning sensation under the denture for a long period

of time. All undercuts need not be removed, a reduction of those that would seriously interfere with the placing of a denture being all that is necessary.

We are now ready to begin extraction of the teeth. It is advisable, wherever possible, to remove as many posterior teeth as the appearance of the patient will permit. It is often possible to remove all but six or eight anterior teeth without the result of such an extraction being evident. Sometimes, it is only possible to remove the molar teeth above and below. In the removal of these teeth, the amount of process is also removed as indicated by the casts mounted on the articulator. The ridge is carefully prepared and the tissue brought together and sutured so that healing will take place as rapidly as possible. This part of the mouth is permitted to heal for from two to six weeks, the time depending entirely on the rate of healing. It has been previously decided whether the restoration is to be of the immediate type or if a period of healing is to intervene between the removal of the remaining anterior teeth and the construction of the dentures.

The advantages of the immediate type of denture are numerous:

Patients become accustomed to the change from the natural to the artificial very quickly. Centric occlusion is easy to establish because it has not been lost and muscle tone continues normal. The normal distance between the mandible and the maxillae is not lost and speech and mastication continue normal. A normal appearance will be comparatively easy to restore and thus embarrassment will be avoided. There is less postoperative pain, bleeding is controlled, healing is more rapid and usually a much better ridge results.

If immediate dentures have been decided on, the dentures are constructed and the teeth removed, a transparent splint made from an acrylic denture base material being employed as a means of determining proper ridge form. If dentures are to be constructed after a short period of waiting, the anterior portion of the ridges is prepared according to the prepared casts or by the use of the transparent splint. If the mouth is properly prepared, it should be ready for impressions in about ten days or two weeks.

The ultimate success of any denture case depends on the preparation of the patient and a knowledge of what is to be expected. A sane, conservative program of patient education will help much in any office. The servicing, relining and resetting of dentures should be discussed and the reason for the construction of new dentures after a reasonable length of time should be fully explained. In far too many cases, the patient leaves the dental office with the firm belief that, with his new dentures, his dental troubles are now over for the rest of his days. It is difficult to explain to such a patient, after a year or so, the need for new dentures; whereas if the patient is properly instructed and educated, he will return for, and expect to have, new dentures constructed in a reasonable length of time or whenever conditions so warrant.

It is necessary to reconstruct dentures because they have been placed on a base that is constantly changing, causing changes in the appearance, lack of function and discomfort. The need for this servicing of dentures should be fully explained to every patient during the steps that are preliminary to actual construction of the case. The change in facial appearance, the derangement of the masticatory apparatus and a lack of function due to a closing bite should be explained. Lines and wrinkles form as the bite closes and these are difficult to remove once they are formed. Ear trouble and deafness may result from condylar pressure on the middle ear from this closing. When presented at the proper time, these facts are in the form of explanation and education, rather than an alibi, which they become when such troubles arise, as they always will.

The already edentulous patient presents still another problem. He either consults the dentist shortly after his teeth have been removed, with rough ridges and a mouth entirely unfit for the placement of dentures; or he has been wearing dentures for years.

It is very difficult to understand why many exodontists and oral surgeons, after removal of the teeth, fail to leave the mouth in condition to receive dentures after a reasonable length of time, unless they are specifically instructed to do so. It should be the duty and the routine practice of every exodontist or other dentist who removes teeth to leave the mouth in the best possible condition for dentures. Many times, these patients believe that they are ready to have dentures constructed, but they must be sent back to have the mouth prepared or may be required to wait weeks or months for sharp edges or bad undercuts to diminish.

The conception of prosthetic dentistry of today is not that of twenty years ago. Today, we believe in the immediate replacement of the natural teeth with the artificial wherever practical. When the immediate denture is not possible or practical, the period of waiting for healing should be as short as possible in order to maintain the contours of the face and to avoid derangement of the masticating apparatus through misuse, lack of function and the formation of new habits.

When the already edentulous patient desires new dentures, the first requirement is a full-mouth roentgenographic examination of approximately ten exposures. From roentgenographic study of nearly 1,000 edentulous cases, many interesting as well as alarming facts present themselves. The alarming findings are the number of roots and residual areas of infection remaining in apparently well-healed mouths and, in many cases, in the mouths of patients who had been wearing dentures from ten to twenty years or longer. The percentage of cases in which areas requiring surgical interference of some sort or other are present is very high. Many of these are the result of early extractions. However, if roentgenograms are taken prior to extraction of any teeth, these complications may be avoided. Needless to say, any foreign body which could harm the patient or interfere with the wearing of dentures should be removed.

The interesting information furnished by the roentgenogram in edentulous cases concerns the composition or radiolucency of the alveolar ridges. In the interpretation of these films, one must, in a visual examination of the mouth, differentiate between ridges that are actually thin and those that permit free passage of the x-rays. Actual observation of these cases seems to bear out the contention that the denser the alveolar bone, the less subject to change are the ridges, and that the more porous or apparently more honeycombed the appearance of the ridges, the greater and more rapid the change that will take place under dentures. This one point alone should lead the operator to take roentgenograms before constructing dentures, because he will thus have a fair knowledge of what to expect in different cases, and records so kept will afford a check on the changing mouth conditions. It is also interesting to observe the rate of healing or the rapidity with which new bone is deposited in the tooth sockets. This will differ in each case and will show that the patient cannot be told that his particular mouth will heal in three months. The roentgenogram alone will reveal conditions as they actually are and it should be used more generally. E. C. Pendleton, of Chicago, has done much work roentgenographically, with a further study of these ridges and tissue conditions microscopically.

Special ridge conditions which develop under dentures are a problem in themselves. Several deserve special mention. The first is the sharp knife-edge which sometimes develops on lower ridges.

These can be surgically removed, although the operation must usually be quite radical; for if only the sharp, spinous crest is removed, the knife edge will re-form in a short time. One often hesitates to operate in these cases because the ridge is usually quite flat after a sufficient amount has been removed, and if the patient is not an understanding type, complications may ensue.

Another quite common condition is the loose flabby ridge on upper ridges, often present in the anterior parts of the mouth, but sometimes encompassing the entire upper ridge. This condition is usually caused by wearing dentures too long or wearing dentures that no longer fit, or by masticating on the anterior teeth through habit or because of lack of posterior teeth. It presents about the same problems in its removal as the knife-edge ridge. In many cases, the removal of the flabby tissues will result in a flatness of the mouth, which may seem to the patient to be a worse condition than the previous one. Dentures can be constructed in both conditions with more or less success without surgical interference; in the lower, by relief over the sharp portion of the ridge and by directing the forces of mastication to those parts able to bear them. The flabby tissue is confined, with as little displacement as possible, in the denture for this type of case, though if an extreme amount of soft tissue is present, the denture will always have excessive movement.

Care should be exercised to avoid the injudicious cutting of muscle attachments. In most cases, it is possible to construct dentures without interference with muscle or tissue attachments. In the few cases in which it is necessary, the technic of making an incision at the crest of the ridge, loosening the periosteum to permit retraction of the muscle to its proper place and then seating the previously constructed denture to hold the muscle to its new place of attachment, seems to be most satisfactory. The space created between the two flaps of tissue on the crest of the ridge heals rapidly, and healing can be hastened by the use of a surgical dressing in the denture.

The methods, technic and procedure described in the foregoing discussion are in use, wholly or in part, in many dental offices. Their use is becoming more widespread every day as prosthetic teachers and clinicians are emphasizing the use and value of proper methods of diagnosis, and in the taking and recording of preextraction records.

The success of any denture service depends on several important conditions. We shall assume that the technic in use in the actual construction of the dentures is good and one generally accepted as fundamentally sound. To be considered, then, are:

A diagnosis embodying a visual and roentgenographic examination of the mouth.

Preextraction records comprising (a) photographs, (b) facial measurements and (c) impressions and shades of the natural teeth.

A planned procedure in the extraction of the teeth and in the preparation of the alveolar ridges.

Insertion of the dentures, as soon as is practical, after removal of the teeth, or the use of the immediate denture.

A roentgenographic examination of every edentulous case prior to the construction of dentures.

A plan of patient education in the wearing, servicing and replacing of dentures.

With such a definite plan of procedure, in the steps that are preliminary to the construction of the dentures, a favorable prognosis is in most cases assured. It is comparatively easy to construct dentures with records and a definite plan of procedure in mind, and health service is rendered the patient in a manner not otherwise possible.

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STUDIES IN TOOTH DEVELOPMENT: THE GROWTH PATTERN OF HUMAN TEETH

PART II

(Continued from November, p. 1793)

By Isaac Schour, D.D.S., Ph.D., and M. Massler, B.S., D.D.S., Chicago, Ill.

THE INCREMENTAL GROWTH PATTERN

Definition.—The different layers of the matrix deposited during the growth of the tooth are delineated by so-called growth or incremental lines (bands of Retzius in the enamel and Owen's lines of contour in the dentin). Each line outlines the surface of the enamel and the dentin obtaining at a particular time, just as each floor of a building represents a successive level during its construction. The completed incremental growth pattern is therefore a graphic representation and summation or natural diagram of the different stages of appositional growth, and is the resultant of the pattern of cellular activity.

Growth Center.—The appositional growth center may be defined as that high point on the dentino-enamel junction or dentin cusp from which cellular activity begins at a maximal velocity and radiates in a definite growth plan. Each growth center gives rise to a lobe or cuspule in the anterior teeth and to a cusp in the posterior teeth.

The pattern of cellular activity is common to all forms and classes of teeth; that is, the cells *per se* are cytologically similar and follow the same laws of growth. The differences in the incremental patterns of different teeth depend only on the differences in the outline of the dentino-enamel junction. But there is a unit common to all the dentino-enamel junctions of all the different classes of teeth, the growth center. The essential or basic formative pattern of a tooth can therefore be seen in any one cusp, the various forms of teeth representing particular coalescences and modifications of these individual growth centers. The different classes of teeth therefore differ only in the characteristic number and position of these growth centers. Peg or cone-shaped teeth arise from but a single growth center and well illustrate the plan of one individual growth center (Fig. 10).

The Incremental Pattern of a Single Growth Center.—If the incremental pattern of any individual growth center is analyzed, it will be seen that each increment is deposited in the form of a cone.

Enamel.—Incremental caps of enamel one globule (4μ) in thickness are apposed daily over each growth center, one above another, until the full height of the cusp is reached. The functional life-span of the ameloblasts limits the particular length of the enamel rod and thus determines the width of the enamel. If there were no limitations to the functional life span of the ameloblasts, the caps would continue to be deposited as in Figure 11. When the life span of the ameloblasts is terminated, the final width of the enamel is established. Therefore, once the full height of the cusp is established, subsequent layers are deposited at the sides only, in the form of concentric truncated cones. This continues until the crown of enamel is completely formed.

Dentin.—Dentinogenesis, like amelo-

genesis, begins at the growth centers, but proceeds apically from without inward at graded intervals concomitant with the recession of the odontoblasts and the dentin-forming cells. Although the differentiation of the ameloblasts occurs before that of the odontoblasts, dentin formation precedes enamel formation slightly. With the exception, therefore, of a microscopic cuspal portion of dentin which precedes enamel formation, dentin and enamel deposition are sychronized so that for each layer of enamel that is apposed, there is a corresponding layer of dentin in the crown (Figs. 10, 12, 13, 14, 15). The deposition occurs daily in rhythmic layers or rings approximately

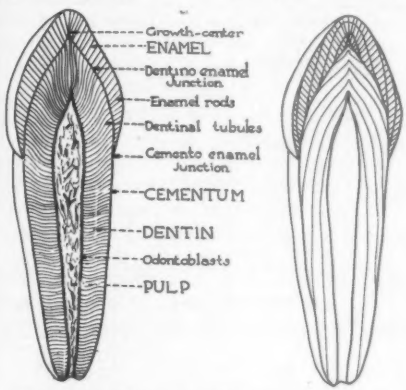

Fig. 10.—Diagrammatic representation of incremental pattern of simple growth center.

4μ thick, depending on the particular rate of apposition of the dentin-forming cells in that region. These layers are not so sharply demarcated as in the enamel. The incremental layers of dentin in the crown are thus deposited in the form of cones, one below and within another. These cones are more sharply angular than those in the enamel.

When the cemento-enamel junction has been reached, the enamel and the dentin of the crown are complete. Subsequent dentin formation, termed radicular, proceeds under the guidance and influence of Hertwig's epithelial sheath. In the completed dentin, structural as well as morphologic differences exist between the crown and root portions. These may be explained upon the basis of various as yet unknown influences exerted during their formative periods.

As in the enamel, when the life span of the dentin-forming cells of the crown

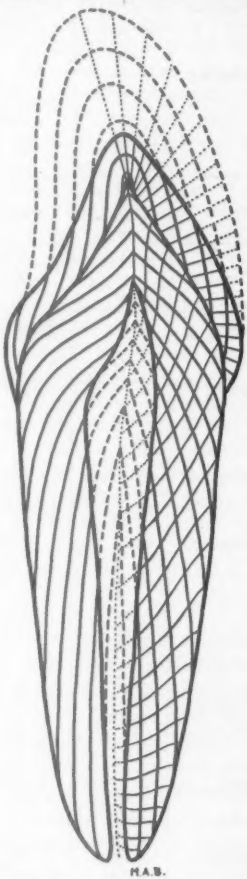

Fig. 11.—Diagram showing resulting form of crown and pulp if life span of formative cells of enamel and dentin were unlimited. Solid lines, normal contour. Dotted lines, abnormal contour.

is completed, subsequent increment layers are deposited in the form of truncated cones (Figs. 10, 14, 15).

TABLE 4.—CHRONOLOGY OF GROWTH OF HUMAN TEETH*

	Tooth	Tooth Designation	Initiation (Odontogenesis) Begins Weeks in Utero	Apposition of Enamel and Dentin Begins Months in Utero	Amount of Crown Formed at Birth	Crown Completed Age Months	Root Completed Age Years
Deciduous	Central incisor	I / a	7	4-4½	5/6 / 3/5	1½-2½	1½
	Lateral incisor	II / b	7	4½	2/3 / 3/5	2½-3	1½-2
	Cuspid	III / c	7½	5	1/3	9	3¼
	First molar	IV / d	8	5	Cusps united	5½-6	2½
	Second molar	V / e	10	6	Cusp tips still isolated	10-11	3
			Months in Utero			Years	
Permanent	First molar	6 / F	3½-4	Birth	Trace	2½-3	9-10
				Age, Months			
	Central incisor	1 / A	5-5½	3-4	0	4-5	9-10
	Lateral incisor	2 / B	5-5½	10–12† / 3–4	0	4-5	10-11
	Cuspid	3 / C	5½-6	4-5	0	6-7	12-15
				Years			
	First bicuspid	4 / D	Birth	1½-2	0	5-6	12-13
			Age, Months				
	Second bicuspid	5 / E	7½-8	2-2½	0	6-7	12-14
	Second molar	7 / G	8½-9	2½-3	0	7-8	14-16
			Years				
	Third molar	8 / H	3½-4	7-10	0	12-16	18-25

*Modified from Logan, W. H. G., and Kronfeld, Rudolf: Development of Human Jaws and Surrounding Structures from Birth to Age of Fifteen Years. J.A.D.A., 20:379, March 1933.

†When significant differences occur between upper and lower teeth, their chronology is indicated separately.

EXPLANATION OF TABLE 4.

The data listed in this table presuppose a normal expression of the inherent growth potential of the teeth; that is, the physiologic age of the individual is equal to its chronologic age. Interference in the internal or external environment may cause wide variations in growth.

The order of tabulation purposely places the first permanent molar at the end of the deciduous series and at the beginning of the permanent series of teeth, in harmony with the chronology of its development.

Odontogenesis begins at the stage of initiation described in the text and in Figure 2A. The early bud stage of the enamel organ is quickly followed by the cap stage (in about one week for the deciduous teeth and in one to two months for the permanent teeth). The bell stage of the enamel organ outlining the size and shape of the dentino-enamel junction immediately precedes the beginning of apposition (column 2).

Apposition begins with the formation of a tiny increment of dentin immediately under the growth center or dentin cusp. The formation of enamel begins a few days later. The first evidence of hard tissue formation as seen in histologic sections is about two months earlier than the first evidence of calcification as seen in the x-ray film. The latter is a record of density only and therefore does not record the apposition of the uncalcified dentin matrix or the early radiolucent stages of calcification in the enamel.

The upper teeth generally begin their formation ahead of the lower teeth (except the upper permanent lateral incisor).

The upper permanent lateral incisor begins its formation at 10 months of age in contradistinction to the other anterior permanent teeth, which begin to form at 3-4 months. This fact is a valuable aid in determining the time of the systemic disturbance causing enamel hypoplasia.

The amount of crown formed at birth as indicated by the neonatal ring is shown in Figures 7 and 8.

The crown is completed when enamel formation ceases, and the time required depends on the size of the crown and the rate of apposition. The formation of the crown is completed in about seven to fourteen months in the deciduous teeth and from four to six and one-half years in the permanent teeth. The cuspid requires the longest time because of the length of its crown.

The time required for the formation of the root depends on its length and the rate of dentin apposition. The deciduous teeth require from one and one-half to two years and the permanent teeth from five to seven years for completion of the root. The cuspid requires the longest time because of the length of its root.

The well-known law that all growth is rhythmic is well illustrated in the beautiful rhythmicity of recurrence of the incremental lines. The law of gradients is illustrated by the fact that the increments are farthest apart near the growth center and become closer as one proceeds peripherally, pulpally and anteroposteriorly.

Incremental Patterns of Different Classes of Teeth.—While the basic formative plan is the same for all classes of the teeth, the final incremental pattern differs for the different classes of teeth just as different types of buildings have different blueprints (morphologic patterns) and different arrangements of floors (increments), although they may employ the same methods, materials and workmen, and construct the building in the same manner. When the cones or adjacent growth centers with their formative cells enter into the sphere of influence of one another, a fusion of cellular activity occurs so that the succeeding incremental layers take on the gross outline of the dentino-enamel junction itself (Figs. 5, 6, 17).

The crown of a five-cusped tooth such as the human lower second deciduous molar represents the approximation and peripheral coalescence of the incremental cones of five individual growth centers.

The anterior teeth are formed from coalescence of three growth centers lying mesiodistally and with the lingual cingu-

lum raised up into the beginnings of a fourth growth center. In the cuspid, the intermediate of the three growth centers lies above the others, while in the incisors all three centers occupy approximately the same level.

In the case of a prominent cingulum or supernumerary cuspule, a tiny growth center, following the same basic growth pattern as the rest, is derived from and coalesced with the lingual surface of the tooth. The bicuspids are essentially cuspid in form with the cingulum raised up into various degrees of promi-

TABLE 5.—RESPONSE OF DEVELOPING DENTIN AND ENAMEL TO SYSTEMIC DISTURBANCES

Systemic Effect	Dentin Reaction	Enamel Reaction
Severe Physiologic	Accentuation of incremental lines (Owen's lines of contour) Dappled dentin (Beust)	Accentuation of incremental lines (bands of Retzius)
Subclinical	Marbled dentin (Mellanby) Interglobular dentin (incomplete fusion of calcospherites)	Hypocalcification (mottled, chalky enamel)
Pathologic	Interglobular dentin (isolated calcospherites) Wide predentin (Odontoblasts showing pathologic degeneration) Lines of arrested or deviated growth	(Ameloblasts showing pathologic degeneration) Lines of arrested or deviated growth Hypoplasia
Mild	Hypoplasia (pulpal inclusions)	

TABLE 6.—COMPARISON OF RING FORMATION IN TREE AND TOOTH

	Tree	Tooth
Tissues Composed of: Formative organs Mode of formation	Wood Dead cells Cambium layers From within outward	Enamel and dentin Extracellular secretions Ameloblastic and dentinogenic layers Enamel: from within outward Dentin: from without inward
Time of increments	Annual rings	Daily rings
Mode of response to variations in external and internal environment*	1. Accentuation of incremental rings (alternating dark and light rings) (In enamel, bands of Retzius) (In dentin, Owen's contour lines)	
	2. Rings of decreased rate of growth (Narrower layer) (Line of arrested growth)	
	3. Rings of hypodensity or hyperdensity (Porous or compact layers) (Hypocalcified or hypercalcified layers)	
	4. Deficient formations (Knots) (Areas of hypoplasia)	

*Fully formed increments cannot be affected; records are therefore permanent.

nence of a fourth and fifth growth center and bringing with it the marginal ridges.

When the growth centers lie so far apart that the peripheral fusion occurs relatively late, as in the molar teeth, the ameloblasts come to lie within deep depressions and may become crowded and receive inadequate nutrition and therefore degenerate early. Deep grooves and pits are thus formed between the enamel cusps. When the growth centers are closer together, as in the incisors, the ameloblasts do not become crowded. Fusion is early and more nearly complete. The different centers are here demarcated only by the mammelons and the shallow labial grooves (Fig. 16).

It has been observed in the study of roentgenograms that the teeth begin to calcify at individual "calcification centers," which gradually extend peripherally, approximate each other and fuse to form the morphologic outline of the tooth (Fig. 17). In the posterior teeth, one calcification center has been observed for each cusp. In the incisor teeth, three calcification centers have been observed, corresponding to the three mammelons and lobes found on these teeth. Observations on the cuspid tooth have been inadequate, but it has generally been thought that it too had three calcification centers, a fourth center sometimes occurring at the cingulum.

Thus the roentgenographic findings

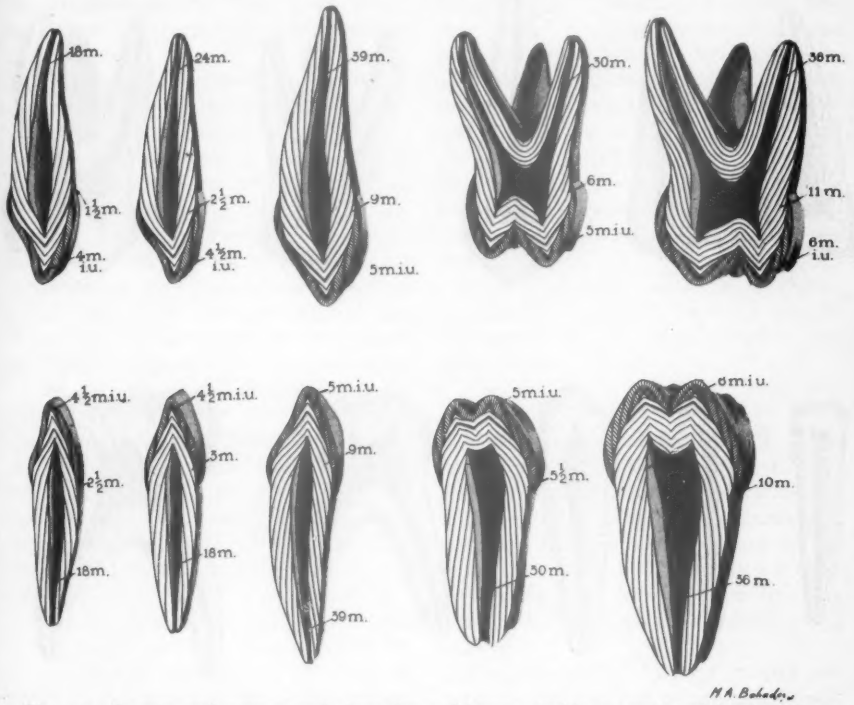

Fig. 12.—Incremental pattern and chronology of human deciduous teeth in labiolingual section. The lines in the enamel and dentin represent approximately three-month increments. The first figure indicates the beginning of appositional growth; the second, completion of the crown; the third, completion of the root.

coincide with the histologic findings that teeth develop from individual centers. Since appositional growth precedes calcification, it would be more correct to call these centers of growth rather than of calcification. In addition, our use of the term "growth center" conforms with Huxley's use of the same term, since growth begins at these centers at a maximal velocity. It should be pointed out that since the x-ray film is a record of density, the stage of tooth development as indicated in histologic sections will be slightly earlier than that indicated by the x-rays.

and definite sequence and grouping (Table 4).

Group I (Prenatal).—The deciduous teeth begin the apposition of enamel and dentin as a group before birth in regular sequence (4 to 6 months *in utero*) from central incisor to second molar.

Group II (First Year—Infancy).—This group consists of the first permanent molar and the permanent anterior teeth and is divisible into three subgroups. The first permanent molar (subgroup A) is the first tooth in the permanent dentition in formation as well as eruption. Apposition begins at birth and is followed at 3 to 4 months by the permanent anterior teeth (central incisors, lower lateral incisors and cuspids) (subgroup B). The upper lateral incisor is an exception in that its

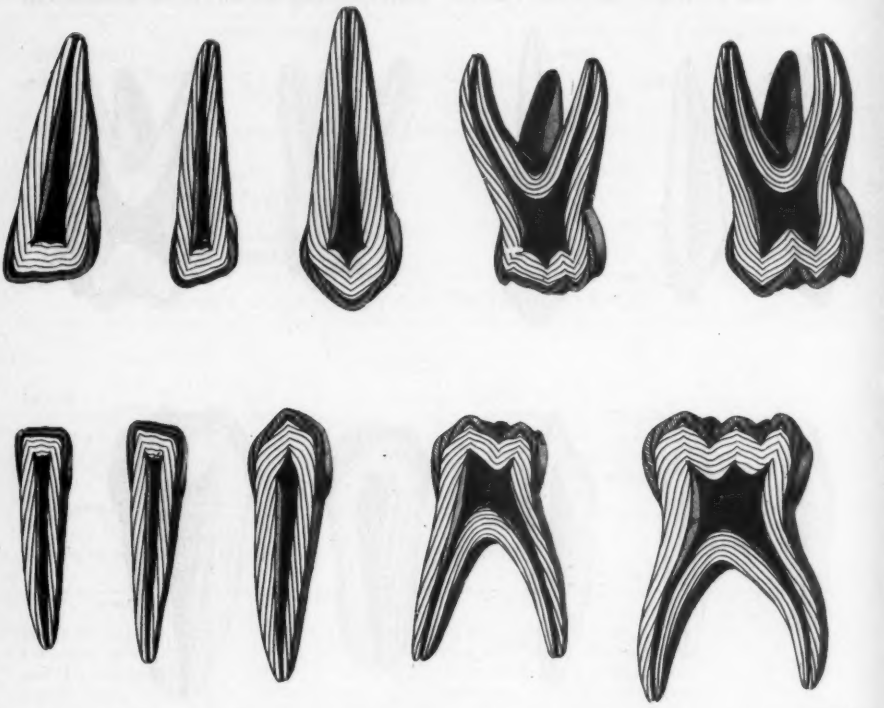

Fig. 13.—Incremental pattern of human deciduous teeth in mesiodistal section. (Compare Fig. 12.)

CHRONOLOGY OF APPOSITIONAL GROWTH

The teeth begin their appositional growth at different ages, but in a regular

formation does not begin until about 10 months of age (subgroup C).

Group III (Second Year — Early Childhood).—After a pause, the bicuspids and second permanent molars begin their formation as a group, at about 1½ to 3 years of age.

Group IV.—After another pause, the third molars begin their formation, at about 7 to 10 years of age.

The upper teeth as a rule begin their formation slightly earlier than do the lower—although the lower teeth generally erupt just before the corresponding upper teeth.

When enamel formation is completed, the crown of the tooth is finished. Enamel and dentin formation proceeds regularly and rhythmically after its inception, and the time required for the completion of the crown depends on the length of the crown and the rate of tissue formation. It takes from seven to fourteen months for formation of the crown of the deciduous teeth. Because of their greater size and slower rate of formation, from three to six years is required for the completion of the crowns of the permanent teeth. Development of the first permanent molar consumes the least time because of its relatively rapid rate of formation. Development of the cuspid, deciduous and permanent, consumes the longest time because of the length of its crown (Table 4 and Figs. 12, 13, 14, 15, 18).

Root formation begins when the crown is completed, and the time required for its completion depends on the rate of dentin formation and the length of the root. The deciduous teeth require from one and one-half to two and one-half years, the permanent teeth from five to seven years. Because of the length of their roots, development of the cuspids consumes the most time.

Histophysiologic Comment.—The anthropologist has long been accustomed to the use of the teeth in evaluating the age of skull specimens. Experimental and clinical analyses of the effects of endocrine and nutritional factors upon the development of the teeth show that the rate and progress of the formation of enamel and dentin are less affected than the eruption of the teeth or the growth of the cranial and facial bones (Schour and Massler[8]). Therefore, the amount of enamel and dentin formation will afford a more accurate estimate of the chronologic age than will the amount of bone growth or eruption of the teeth. The use of the x-rays makes it possible not only to estimate more accurately the dentitional age of a specimen, but also to employ the amount of dentin formation in the crown or root as an index of age. The use of such a criterion is of course limited to the first decade of life, after which time the degree of attrition can be used, although it is a variable factor and dependent on the physical character of the diet.

A more accurate measure of chronologic as well as physiologic age may be the amount of growth exhibited by the facial bones.

TOOTH RING ANALYSIS

A knowledge of the normal incremental pattern makes it possible to analyze constitutional and pathologic accentuations, and provides another method of assessing the health and disease of the growing individual. This method is comparable to that employed in tree-ring analysis and is therefore called tooth-ring analysis.

The incremental lines of growth are normally the result of a daily physiologic rhythm in cellular activity. Certain systemic factors of the internal or external environment may so influence the cellular activity as to produce an incremental line or layer which is easily distinguished from the normal. These lines are commonly called bands of Retzius in the enamel and Owen's lines of contour in the dentin. The time of the effect can be dated by the chronologic position of

Fig. 14.—Incremental pattern and chronology of human permanent teeth in labiolingual section. The lines represent approximately yearly increments. The first figure indicates the beginning of appositional growth; the second, completion of the crown; the third, completion of the root.

Fig. 14.—Incremental pattern and chronology of human permanent teeth in labiolingual section. The lines represent approximately yearly increments. The first figure indicates the beginning of appositional growth; the second, completion of the crown; the third, completion of the root.

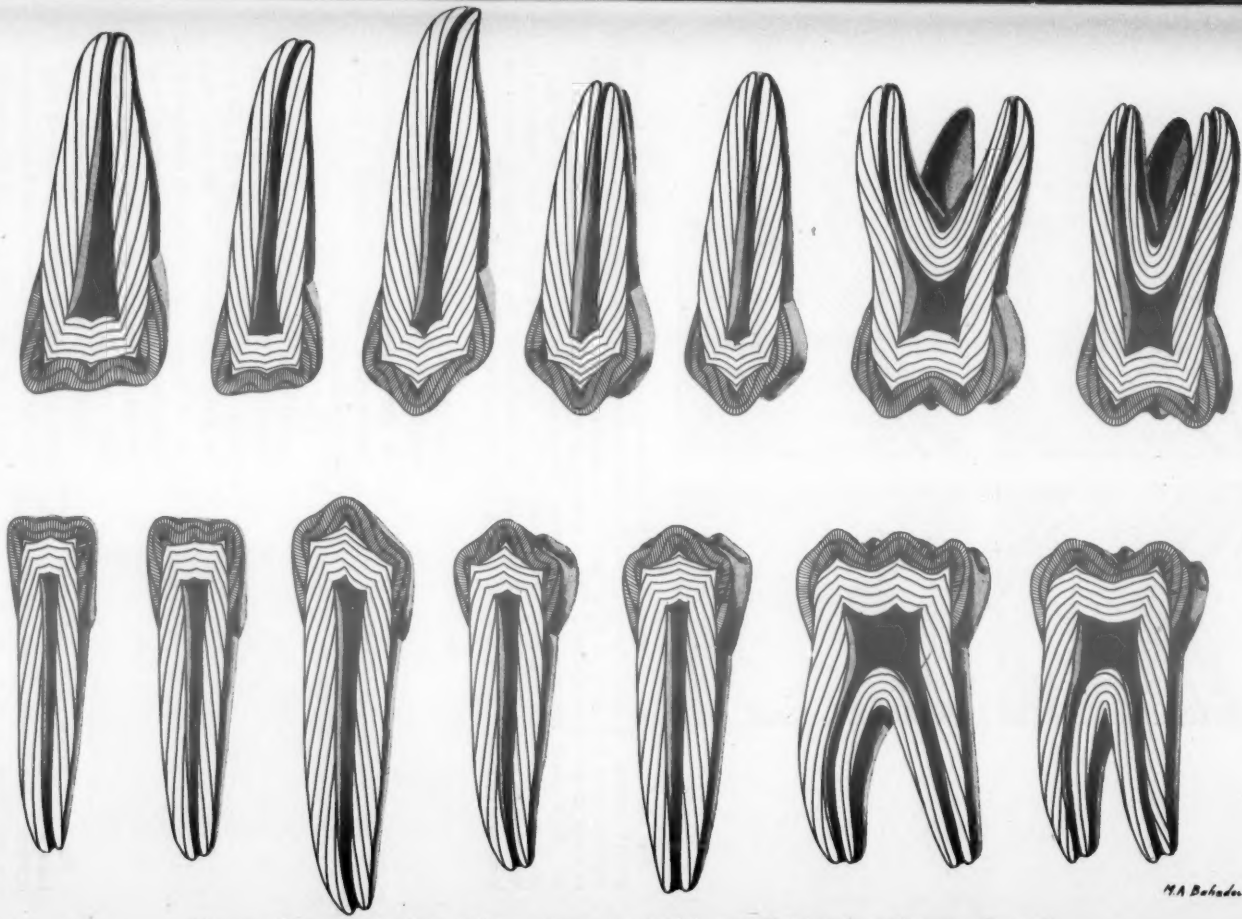

Fig. 15.—Incremental pattern of human permanent teeth in mesiodistal section. (Compare Fig. 14.)

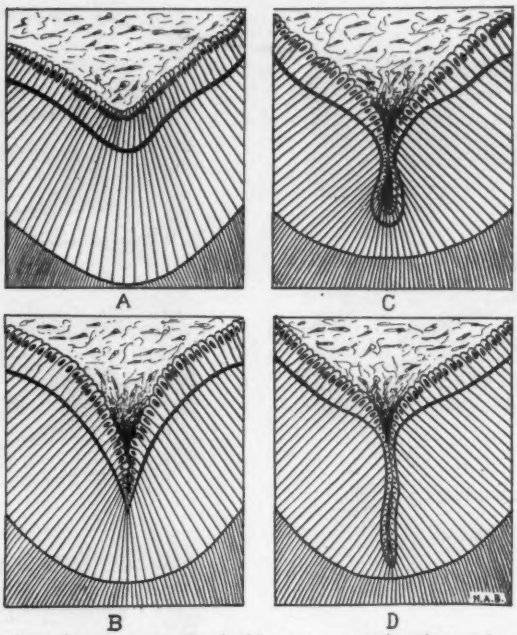

Fig. 16.—Formation of grooves or pits incident to approximation and peripheral fusion of growth centers. A, fusion between two low and flat cusps or two growth centers placed closely together as in formation of labial grooves in anterior teeth. B, growth centers farther apart or cusps steeper as in bicuspid. The ameloblasts at the bottom of the groove are crowded and die. As a result, the enamel rods are short. When the cusps are very high or farther apart, as in a molar tooth, the path of recession of the ameloblasts during enamel formation is toward each other, with the result that they are crowded and the completion of enamel-rod formation by these cells is impossible (C and D). A deep groove or pit results.

Fig. 17.—Lower first permanent molar (age 9 months) showing five discrete "calcification" centers with peripheral approximation and fusion.

the affected incremental layer. The intensity of the condition will be reflected in the degree to which the particular incremental layer is deficient in growth or calcification (Table 5).

The rings of the teeth may be compared with the annual rings of the tree. There are, first, the normal incremental rings. In the tooth, these are of a diurnal or daily rhythmicity; in the tree, they are of a seasonal or annual rhythmicity reflecting the normal environmental variations of summer and winter (Table 6, Fig. 19). In addition, there are those vicissitudes which cause the accentuation of a particular incremental layer or ring. In the tree, an environmental disturbance such as an unusually hot and dry summer

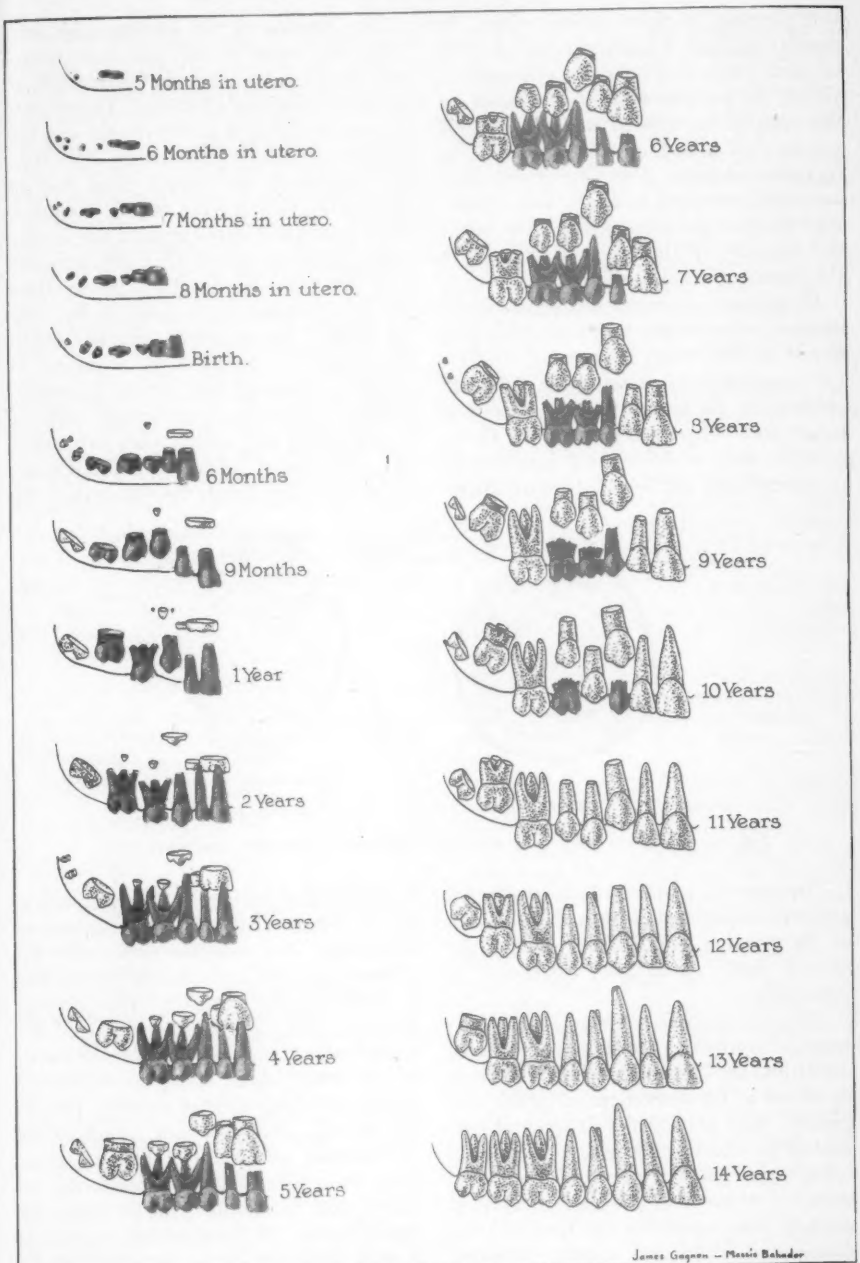

Fig. 18.—Diagrammatic representation of chronology and mode of development of human upper teeth.

will produce a characteristic ring. By careful analysis of characteristics, a series of such rings can be dated (Douglas,[19] Glock[20]). In the teeth, vicissitudes of the internal or external environment will produce an analogous accentuation of an incremental layer. The time of the effect can be determined easily by the chronologic level of the incremental layer, while the intensity of the effect is reflected in the degree of the disturbance.

In general, accentuations of an incremental layer in the tooth may be produced by two types of systemic effects: (a) constitutional or normally recurrent episodes in the body economy (neonatal rings) and (b) pathologic effects. These, in turn, may be subdivided into defects of the external and internal environment.

The reading of this kymographic record is facilitated by the fact that enamel and dentin react somewhat differently to the same condition (Table 5). The enamel is more sensitive than the dentin and has a lower threshold of reactivity. However, its response is less varied than that of the dentin, as if it were unable to express itself in so great detail as does the dentin.

It should be noted that the intensity and the time of the effect rather than the specific cause is recorded in the dental tissue. For example, enamel hypoplasia may be produced by a variety of causes (syphilis, rickets, tetany, fluorosis), and the degree and chronologic level of a hypoplasia will reflect only the intensity and time of the effect of the disease.

On the other hand, the response of the

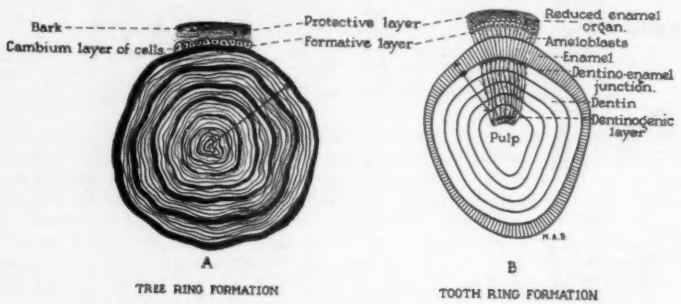

Fig. 19.—Diagram comparing mode of formation of tree rings and tooth rings.

The growing tooth thus acts as a kymograph which records within the structure of its growing enamel and dentin the normal and pathologic variations in metabolism.

This makes possible the analysis of systemic disturbances in metabolism and constitutes the basis for tooth-ring analysis as an aid in the assessment of health and disease. The normal developmental pattern of the child is reflected in the normal calcification pattern of the enamel and dentin (prenatal, infancy and childhood periods demarcated by the neonatal, infancy and childhood rings) (Massler, Schour and Poncher[21]).

enamel and dentin to a particular condition is often a characteristic syndrome or composite. For example, while the accentuation of the incremental pattern can be produced by a variety of conditions, fluorosis affects the enamel first and the dentin only in more severe doses. Rickets, on the other hand, causes an accentuation of the incremental pattern, first in the dentin, and does not at all affect the enamel unless the deficiency is so great that a hypoplasia is produced, by which time the dentin will be markedly interglobular. A characteristic syndrome is thus produced by a particular condition (Schour[22]).

Upon the kymograph of the growing enamel and dentin are therefore written the time and intensity of the effect in a manner which is characteristic, if not pathognomonic, of the condition. Tooth-ring analysis is an attempt to interpret the language written in the incremental pattern of the tooth during the development of the individual.

It must be pointed out that tooth-ring analysis is limited to the time encompassed by the growth of the enamel and dentin. In the dental structures of continuous growth, like the investing and supporting systemic tissues (gingivae, alveolar bone, periodontal membrane and cementum), such records are transitory because of continued replacement and regeneration. On the other hand, adult enamel and dentin which have stopped growing cannot be affected by systemic disease and show only those disturbances in metabolism which occurred during the growing period.

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THE DENTIST, THE DENTAL TECHNICIAN AND THE PUBLIC

By WALTER H. WRIGHT,* D.D.S., Ph.D., Pittsburgh, Pa.

NINETEEN FORTY is being celebrated as the centennial year of organized dentistry. It may therefore be worth while to review our beginnings, consider our present status and give attention to certain matters that may concern us in the future.

Prior to 1840, dentistry was not organized in this country, but with the publication of the *American Journal of Dental Science,* in 1839, the founding of the Baltimore College of Dental Surgery, in 1840, and the organization of the American Society of Dental Surgeons in the same year, dentistry, in America, began to take form. Before 1842, legal requirements for admission to the practice of dentistry were practically unknown in the United States. Alabama[1] was the first state to require an examination for admission to the practice of dentistry. This precedent was followed, in 1868, by Kentucky, New York and Ohio, and by 1900 all states in the Union had passed similar statutes.

Long after the founding of dental schools in America, dentists continued to be taught by the preceptor method. In fact, many dentists discouraged institutional training for dental practice and continued to reap profits both from teaching and from the labors of those whom they had taught. By 1900, however, the preceptor method had been superseded by formal dental education as required by state laws. Before 1880, there were only thirteen dental schools in the United States, but as the states began to require formal dental education for admission to the practice of dentistry, dental schools began to flourish. Within the ten year period 1880-1890, twenty-one schools were created; while the decade 1890-1900 saw an additional twenty-three schools, bringing the total to fifty-seven schools in 1900, the high water mark in dental education. Many of these schools were founded primarily for profit, with little regard for educational and professional standards. Comparing the years 1880 and 1900, we find thirteen dental schools and 12,314 students in the former, and fifty-seven dental schools and 27,769 students in the latter, an increase of forty-four schools and 15,455 students in twenty years. As might be expected, many of the graduates were inadequately prepared both in technical procedure and in the biologic background of dentistry. While these partially qualified graduates were entering the profession, there came upon the scene a new and potent factor in dentistry, one that began to change the attitude of the profession toward prosthetic dentistry. This factor has become increasingly important and may in the future vitally affect the relationship between dentist and patient. I am speaking of the commercial dental laboratory.

The first commercial dental laboratory was founded by Frank F. Eddy in the City of Boston. The circular advertising the opening of that laboratory contained the following announcement:

Read before the Section on Full Denture Prosthesis at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

*Professor of prosthetic dentistry, University of Pittsburgh, School of Dentistry.

We trust that upon consideration of the matter you will become convinced that you can better afford to send us whatever work of this description your practice may demand, than to wear yourself out in trying to do it before and after office hours, thus depriving yourself of the rest and recreation you need to enable you to do your best work for your patients.[2]

The psychology of that advertisement appealed to some of the dental profession, while others continued to do their own laboratory work with the moral assurance that it was their professional duty to plan and make the restorations needed in treating their patients.

The commercial dental laboratory was a success, opening the way for rapid development in that field. One after another, dentists yielded to the advertising of the commercial laboratories and, in 1930, it is estimated, there was one laboratory to every twenty practicing dentists. Records for 1930 show an estimated total of 3,400 laboratories, employing approximately 23,000 persons, or one laboratory worker to every three practicing dentists. At present, there are perhaps 2,000 laboratories and 12,000 technicians. The numerical growth of the commercial dental laboratory is shown in the following table.[3]

Year	Dentists	Commercial Dental Laboratories	Ratio of Dentists to Laboratories*
1890	17,498	2	8,749:1
1900	27,769	14	1,983:1
1910	32,836	30	1,095:1
1914	42,406	55	771:1
1920	56,152	100	562:1
1925	64,481	250	258:1
1930	67,334	3,400	20:1

*Approximately.

Let us analyze this situation more carefully. In 1880, all dentists either did their own laboratory work or were aided by an assistant who worked under their personal supervision. In 1930, fifty years later, more than 90 per cent of practicing dentists, according to the Dental Laboratory Code Hearing, depended more or less on the commercial laboratory for their laboratory work. In 1880, all of the procedures were under the supervision and control of the profession; whereas, at present, all except chairside operations have been delegated by many dentists to the commercial industry, entirely outside the dental profession. In 1930, the dental profession paid $46,000,000, approximately $900 per dentist, for laboratory work which the dentist himself is qualified to do. The quality of the work that the profession received in return, I shall leave to your judgment. The quality of service that the public received, I leave to your conscience.

So dependent was the profession on the commercial laboratory that during the code hearing on the Dental Laboratory Industry in 1933, it sent representatives to Washington to protect its interests. Further, in 1935, during the dental technicians' strike, many dentists found themselves at the mercy of the dental laboratory. With inadequate laboratory equipment in their offices, they could do nothing but wait until the strike was over. There must be something wrong with a profession whose oral health service can be curtailed while commercial interests quarrel among themselves over the spoils. There is something wrong: it is with us. We have forgotten the high responsibilities which the public has laid upon us. We have followed Mammon.

We have forgotten the long struggles of our predecessors to free dentistry of the charlatan and the quack and to obtain a license. We have winked at the Golden Rule in rendering service to the public, and awaken to find ourselves beseiged on all sides by commercial interests which have taken lessons from the profession. A good rule works both ways, and the dental profession may expect to reap what it sows.

The next step in this encroachment upon the rights of the dental profession may be an attempt by some of the com-

mercial dental laboratories to serve the public directly. In fact, this step has already been taken in Chicago by certain well-known laboratories, which appealed directly to the public through the advertising columns of local newspapers and the telephone directory.

Not all laboratories are at fault, nor are all dentists guiltless, as was shown not a long while ago[4] when attention was called to the part certain dentists were playing in corrupting the laboratories. To quote:

> Our attention has recently been called to a vicious practice whereby a few dentists are practically forcing the laboratories into a procedure which is basically unsound, and which the laboratories are very properly resisting. Referring the patient direct to a dental laboratory for certain services such as the repair of dentures is inviting a most undesirable contact, and is unfair to the patient; besides being inexpedient from the viewpoint of the dentists. It is probable that most laboratories realize that this practice is not to be condoned, and yet they are in a position where it is difficult to refuse if a dentist requests this procedure.
>
> When, in addition to this, the dentist requests the laboratory to act as collection agency, demanding a fee from the patient which is to be divided between the laboratory and the dentist, a distinctly dishonest transaction is being proposed. In such case the dentist is receiving a fee and rendering no service whatever, while if that case is delivered to the patient by the dentist, a service is being rendered and a responsibility accepted for which the dentist is entitled to remuneration; because if dissatisfaction should result the dentist is the only person qualified to rectify it by any reconstruction requiring new procedure within the mouth.
>
> The profession should discern that any direct contact between the patient and the laboratory is undesirable, and should support the laboratory industry in preventing any tendency to disregard this basic principle of proper conduct.

Presumably, the better element in the laboratories industry has abhorred such conditions and has, from time to time, made a definite effort to remedy the situation through the proposed licensing of dental technicians. The dental profession is doubtful regarding such license because of the secrecy attending these moves in the past and because it recognizes the actual state of affairs among the laboratories. There are many good laboratories and these cater to a group of dentists who render good dental service. On the other hand, there are a greater number of poor laboratories, which are patronized by dentists many of whom are doing poor work. As long as this condition exists, neither a license nor a code, nor any other legal restrictions, will prevent certain laboratories from doing what they wish to do.

Let us go back in the records a few years and see what the commercial dental laboratories have been doing. In 1923, a bill in the legislature of the State of New York to license laboratory technicians as "prosthetic dentists," was defeated. In 1929, the laboratories of New York State succeeded in securing a law giving them licenses as "master dental technicians." The law gave the "master dental technician" a certificate to practice as a dental technician or to conduct a dental laboratory. The significance of the term "to practice" is not known, since the law was repealed, though only after a tremendous effort on the part of the dental profession.

In the summer of 1933, while the government was operating under the "Blue Eagle," the hastily organized National Dental Laboratories Association met in Chicago and prepared a code, which later was submitted to the National Recovery Administration in Washington for its approval. This code was deliberately drafted and voluntarily submitted by dental laboratory leaders, although the dental profession was led to believe that the dental laboratory group had been forced by the N.R.A. to submit a code. The code was universally opposed by the dental profession, but, in spite of the protest, it was finally approved, January 22, 1934.

If time permitted, I might consider at length the attitude of some of the heads of the commercial dental laboratories. The following statements, while objected to by certain leaders, seem to reflect pretty generally the attitude of the average commercial dental laboratory. "I take my hat off to the thousands of highly trained and skilled loyal dental technicians without whom, in all truth, the dental profession could not exist."[5]

"But the dental laboratory is a part of the dental profession only insofar as the analogy of a processor of flour being part of the baking company business."—N. Berger, Code Hearing, p. 128.

"Up to now, all work was done by a junior technician,-and now it goes to the head man, who without seeing the patient, without having the slightest inkling of the contour of the patient's face, must choose the form and the size of the teeth, and set them according to the particular anatomical peculiarities of a given mouth. Upon this setting depends the appearance of the patient, his ability to masticate, and to speak."—Henry Posner, Code Hearing, p. 172.

While the last quotation might appeal to the vanity of head technicians, the dentures made according to this formula would hardly be expected to appeal to the vanity of the patient.

During the code hearing, when it came to a question of wages, laboratory leaders found themselves in a very embarrassing situation, for it was obvious that highly skilled technicians should receive high wages. Realizing their predicament, some members of the group admitted that first class technicians are very few, and, further, that a great majority of technicians are only finger-trained workers requiring constant supervision.

As you know, the code is no longer in effect and the National Dental Laboratories Association now struggles in vain to hold together the recalcitrant laboratories. Three times, the leaders in the commercial dental laboratory groups have attempted to gain official and legal recognition, and twice they were temporarily successful. Today, the same agitation continues in New York, Illinois and California.

We may learn some of the dangers inherent in the present profession-technician relationship in America by recalling what has happened in England and in Germany. In England, prior to 1921, each established dentist had an assistant to help him with the laboratory work. There were, before that time, few commercial dental laboratories in England. In 1921, when panel dentistry went into effect, those dental technicians were licensed to practice dentistry with all professional rights and privileges. Shortly thereafter, the commercial dental laboratory made its appearance in England, to take the place of the technicians who had been licensed.

Germany also affords an example of the aggressions of dental technicians. The German Dental Practice Act is peculiar in that it does not prohibit incapable persons from practicing certain kinds of dentistry. However, it does hold them legally responsible for injuries or accidents affecting the health of the patient. As might be expected, dental technicians who had worked for graduate dentists *(Zahnärzten)* began to practice those non-surgical types of dentistry not prohibited by law. In order to elevate their standing, the technician-dentists *(Dentisten)* founded schools for the training of those who desired to enter practice. Gradually, they extended the scope of their practice to include not only prosthesis, but also operative dentistry and exodontia. Prior to Hitler, it was a common occurrence for *Zahnärzten* to be called in as expert witnesses in lawsuits between technician-dentists and patients. Under Hitler, the status of technician-dentists has changed. They now enjoy greater privileges than the *Zahnärzt*. It is reported that the university dental schools have been closed while

those operated by the technician-dentists are allowed to remain open. At present, there are approximately 13,000 *Zahnärzten* as compared with about 22,000 technician-dentists in Germany. The latter are now permitted to treat health insurance patients who formerly were treated exclusively by the *Zahnärzten*.

Many of these technician-dentists who formerly worked as dental-technicians for the *Zahnärzten* are now employing dental-technicians in their own offices or sending their laboratory work to the commercial dental laboratories. There must be little or no regard for the dental health of the public, when the law permits today's technician to hang up a sign and practice dentistry tomorrow.

From this example, we may learn two important lessons. The first is that the politician in charge of health service programs is no respecter of persons. His chief concerns are votes and prices. When money can be saved, he may regard a denture made and inserted by a laboratory technician as quite adequate for the oral health needs of the electorate. Any recognition of the dental technicians other than as adjuncts of the profession will open the way for exploitation of prosthetic oral health service, if socialized or insurance dentistry should become a reality in America. Secondly, it is evident that licensing of technicians would legally delegate to them certain phases of dentistry which inherently belong to the dental profession. Such an arrangement would cause no end of controversy and friction between the profession and the technicians, and may lead to the disruption of dental practice. As we have seen in Germany, when a dental technician entered the practice of dentistry, he in turn had dental technicians to help him. These helpers, in turn, were privileged to enter practice, and thus was started a vicious cycle which cannot but end in the degradation of dental health service because of overcrowding and competition.

Humanity desires to advance. If all the dental technicians in America were licensed to practice prosthetic dentistry tomorrow, in a few days thereafter other technicians would take their places and demand the same license. This problem cannot be solved as readily as some would have us believe.

Some dentists regard the technician problem as unimportant because they think that such privileges to practice dentistry would never be granted in America. I therefore present a brief account of the profession-technician controversy in Illinois.

June 24, 1938, the Chicago Dental Society appointed a commission of five dentists to act as a liaison agency between the society and the dental laboratory industry. Several meetings of the joint committee were held to discuss matters of mutual interest. Suddenly and without the knowledge of the Chicago Dental Society, the Dental Laboratory Association sponsored and had introduced into the state legislature Senate Bill 337, which was designed to grant licensure to laboratories and registration to technicians. In addition, the technicians submitted petitions to uninformed dentists requesting their signature. These petitions were requests to the state legislature for license of dental laboratories and registration of dental technicians to protect the public from imposition and fraud.

At a meeting with laboratory representatives, the profession showed that "illegal practice of dentistry by technicians" could not be prevented by the proposed Senate Bill 337 because such practice by technicians and others is already banned by the Dental Practice Act, which at present is being made more stringent. Heedless, the technicians continued to support the bill, while organized dentistry of Illinois opposed it. I quote[6]:

If this laboratory group legislation had, as its only effect and purpose, the abolition of

the illegal laboratory, there could be little disagreement. The fact remains, however, that the laboratory legislation, designedly or not, provides a potential method for the practice of dentistry by technicians. It can also lead to the establishment of two levels of dental practice in which the technician as well as the dentist will participate.

The bill was defeated at the first reading in the Illinois State Senate, June 24, 1939. During the same week, a raid on one of Chicago's larger illegal dental laboratories resulted in the owners pleading guilty and agreeing to discontinue their illegal practices. Thus, almost simultaneously, the Dental Practice Act of Illinois was effectively enforced and the proposed laboratory licensing bill was defeated. For the moment, the integrity of the profession has been preserved.

The law at present regards the dentist as the only qualified person to practice dentistry.

Prosthetic dentistry, in both its clinical and laboratory practice, has been and continues to be a legal and inalienable part of the practice of dentistry, and to maintain proficiency in all accredited improvements of these procedures.[7]

Today, the dentist has control. The question arises as to whether he will maintain his position. If the laboratory work of prosthetic service is beneath the dignity of the dental profession, why not turn prosthetic dentistry over to the technicians? They would indeed be highly honored to serve the public.

If a dentist loses interest in the fundamental procedures in dental service, the public will find some one who has not lost interest. That this has already happened in some instances is shown by the following quotation[8]:

Nor do those who patronize the illegal practitioner for denture work feel they are dealing with crooks. Rather they think they have made a good stroke of business by eliminating the middleman. They get the same kick out of getting a denture direct that a dentist gets out of buying a radio, a suit of clothes, or a set of furniture direct, wholesale. Any dentist will cut out the middleman on any purchase any time. And we might add, who doesn't? What dentistry must remember is that to the public there is nothing so inherently sacred about a set of teeth, that they should require the ritual of a dental office to make them function.

If dentistry desires to retain the laboratory procedures as an inalienable part of its practice, it must again assume the personal supervision of the laboratory steps of dental service and not delegate them to commercial dental laboratories. If the profession intends ultimately to turn over the practice of prosthetic dentistry to the laboratories, it could not devise a better way of doing it than to further the present relations between the dentist and the laboratory. The real solution to this problem is to be found in each dentist's doing his own laboratory work, or supervising its construction under his own professional control. For a self-contained dentistry, the future is safe; but when that future is shared with commercial interests, it becomes precarious.

In this brief review of the commercial dental laboratory situation, perhaps enough has been said to show the trend and to indicate our professional duty.

Now let us consider some allied problems which may be indicative of present trends. For one thing, there is a growing tendency among dental manufacturers and laboratories to stamp dental restorations with their trademarks. This practice has already come to the attention of the public and has led to serious embarrassment of the profession in rendering oral health service.

Any prosthetic appliance made by or for a dentist is the property of the dentist and a part of the individual service rendered to his patient to meet oral health needs at that particular time. The dentist alone knows best what materials should be used. Any attempt on the part of manufacturers, or fabricators, to trademark their materials is designed to create, among the public, a demand for

that specific material. Requests by patients for certain materials definitely interfere with the dentist's own choice, his training and his judgment in prescribing that method which he knows to be best for the individual requirement of each patient. Refusal by the dentist to gratify the patient's request for trademarked products may result in the loss of professional esteem and the loss of practice.

Today, our patients go to the store and ask for products by their trade names and they are warned to accept no substitutes. If the trademarking of dental products continues, may we not expect our patients of tomorrow to demand "stickla" denture bases, "better bite" teeth or "pinkite" condensite, and get them?

Now we come to the "mail order dentist" with his long promises and short performances. My attention was first called to this racket by a friend, who, after receiving the third set of mail-order teeth, was the "laughing stock" of the neighborhood because, as he himself explained, he looked "like a braying ass." Experience is a dear teacher; and the profession might allow the public to learn by experience, if it were not for the fact that some of these organizations are headed by graduate dentists. This fact lends, at least to the public, a flavor of professional sanction to the deception which such unprincipled individuals practice. Further, not content with their own shortcomings and failures, they denounce and belittle the dental profession in order to increase their own business. Following is part of a circular contained in a package sent to a prospective customer by Hod Williams, Krause Building, Tampa, Fla.:

I have a better way! Hod Williams, M.D., D.D.S.

You can take a much better impression in the privacy of your own home than anyone else can. You KNOW the "feel"—Your Dentist must "GUESS."

When your Dentist makes a plate, he simply takes an impression—sends it to us—or some other large Dental Work Shop, and your plate is made entirely by "guess." The mechanic never sees YOU—and you never see the plate until it is finished.

Why Pay Enormous Professional Fees?—when you can have them made direct—and very much better,—BY MAIL—as you can move the teeth in the wax to the little peculiarities of your natural teeth, that no dentist, nor anyone else except you, yourself, could possibly know.

BY MAIL — CHEAPER — BETTER — and the only means to get your real INDIVIDUALITY — EXACTLY THE WAY YOU WANT THEM — and no dentist to impose his ideas on you either.

HASTE IS THE ENEMY OF TEETH—The Dentist is always in a hurry. Take your time to get these right. What are a few days to a lifetime of comfort and satisfaction? Send them back to us 1-2 dozen times if you wish, but remember, you wear those all your life—so let's *take our time* and *get them right.*

OUR GUARANTEE—We will do the very best we can, and if you will help us, take your time, and get EXACTLY WHAT YOU WANT, WE ARE SURE we can give you a fine plate. It is up to you—and if you do not get what you want we will make your work over completely for you at least once, without charge. Our middle name is S E R V I C E—we will surely give it to you. But it is primarily up to you—we are simply your mechanics—you are your own artist—and naturally you know far better what you want than it is possible for any Dentist to know—Take your TIME and get these RIGHT.

It is deplorable that some who bear the title of dentist should be caught in the meshes of such non-professional, commercial advertising, get-rich-quick schemes.

The seriousness of the mail order denture business, while unknown to some dentists, has for some time engaged the attention of the U. S. Postal Department. February 21, 1938, a "fraud" order was issued against Dr. Heininger, refusing him the use of the United States mails.

June 3, 1938, the Columbia District Court issued a ruling granting to S. B. Heininger an injunction restraining the United States Post Office Department from enforcing the "fraud" order issued on February 21, 1938.

Since 1926, Heininger has been engaged in selling to the public through the mails artificial dentures which he constructed from impressions made by the patient. His advertising included testimonials from customers, some of which were fraudulent, and statements of perfection impossible of attainment.

April 17, 1939, the United States mails were again closed to Heininger by a decision handed down by Associate Justice Miller, of the United States District Court of Appeals for the District of Columbia. This decision, it is to be hoped, marks the beginning of a nation-wide movement against a business that has flourished on the credulity and support of approximately 200,000 Americans.

Yesterday's trails are today's highways; and today's trends may be tomorrow's realities. American dentistry through the past century has developed into the highest type of oral health service in the entire world. As it is taught at present, it represents an equivalent of an oral specialty of the practice of medicine. Having reached a point where American dentistry leads the world, are we going to ignore those trends which, in other countries, have become realities to the detriment of oral health service to the public? Shall we continue to hand over to commercial interests the majority of the technical procedures, which constitute an important part of the practice of dentistry, while dentists sit in their offices waiting for the next patient?

We are licensed to practice an oral health service and not to dispense appliances made by dental laboratories.

Is it not clear that thoughtless members of the dental profession who abuse their privileges and consign important work to less qualified persons are in danger not only of being deprived of their privileges, but also of exposing the entire profession to the same fate?

My plea is in behalf of the public, for I have seen how the patient suffers when a careless dentist and a money-making laboratory get together. American dentistry calls for an individual oral health service rendered to the patient directly, by a thoroughly competent and licensed dentist. To attempt mass production of dental appliances through the aid of the dental laboratory paves the way for a grade of dentistry that is unsatisfactory both to the patient and to the dentist.

The dental profession has a responsibility to the public which cannot be discharged by mere talk. Action is necessary. Therefore, the following recommendations are offered:

1. Dentists should demand enforcement of dental practice acts. Dental license fees which should protect the dentist by providing enforcement are now being used for other purposes.

2. Dental practice acts should be amended, if necessary, to prevent the illegal practice of dentistry by laboratories and technicians.

3. A joint study of the profession-technician relation should be made by official representatives of both groups in an effort to correct prevalent irregularities and abuses.

4. Dentists should neither ask nor permit technicians to do any intra-oral work for patients.

5. Dentists requiring technical assistance should employ technicians in their own offices.

6. Only the strictly extra-oral steps of prosthetic work should be delegated to technicians by dentists who patronize the laboratories.

7. If technical assistants are necessary, the profession should be concerned with their training and have an effective part in controlling them.

8. Looking to the future, the dental profession must work for the betterment of its oral health service by assuming the obligations implicit in the license to practice dentistry, and by discharging its professional responsibilities with regard for the best interests of the public.

I quote from dentistry's illustrious first educator, Chapin A. Harris, of the Baltimore College of Dental Surgery:

If you would command respect and enjoy the confidence of those among whom it may be your lot hereafter respectively to reside, let it be your persevering endeavor to deserve them. Resolve that you will not be satisfied with mere mediocral abilities. . . . Resolve to put forth all your energies for its acquisition, that you may be able to rank among the most scientific and skilful. Let, then, a pure and high ambition stimulate you to zealous and unwearied exertion, and be assured that you will never be reproached by the future, for time misspent, or for failing to realize to those who shall seek professional aid at your hands, the benefit which the art is capable of bestowing.[9]

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AMALGAM MANIPULATION: MANUAL VS. MECHANICAL AIDS

PART II. COMPARISON OF CLINICAL APPLICATIONS

By JAMES T. SWEENEY,* D.D.S., Stockton, Calif.

DURING the last thirteen years, I have had an extensive clinical experience with amalgam at the California State Hospital in Stockton. It could be said that this experience has been intensive as well, because, at the hospital, amalgam has been used indiscriminately in all types and classes of cavities. Gold is not furnished by the state, but silicate cement is. I have deliberately limited the use of silicate cement to a few fillings in which permanency was not a factor.

In such an institution, with more than 4,250 inmates, with but one resident dentist and an occasional dental intern to furnish dental health service, the time necessary for replacing silicate fillings cannot be justified. We have in the hospital many patients who have amalgam and silicate restorations side by side. It is not difficult to see that the amalgam fillings are rendering better health service to the patients. A Class III or Class IV amalgam filling, if well condensed and

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Read before the Section on Operative Dentistry at the Seventy-Sixth Annual Midwinter Meeting of the Chicago Dental Society, February 12, 1940.

carefully polished, will retain a pleasing appearance for an indefinite period of time if mouth hygiene has not been neglected.

Do not infer that I am or have been satisfied with my amalgam fillings, but I do know that the life expectancy of the later fillings is longer than that of earlier ones. The use of amalgam in the anterior teeth early demonstrated defects such as extrusion from the cavity, fracturing of the margins and loss of polish. The slightest defect is very noticeable in anterior fillings. Defects which could possibly pass unnoticed in posterior teeth are very evident in the Class III and Class IV fillings. The greater part of my clinical research has been done with these types.

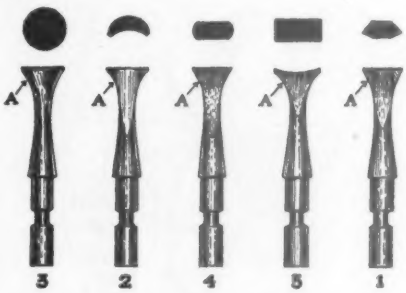

Fig. 1.—Five fundamental condenser shapes that have been found adequate for all cavities in posterior teeth. The smaller points 1a and 2a are not shown and are smaller sizes of the hexagon and the crescent shapes. A, ledge for eliminating excess mercury as filling progresses.

In our previous experiments with mechanical amalgam condensers both of our own and of other designs which were on the market, we soon learned that it was necessary to remove a certain amount of excess mercury from the mix before inserting it into the cavity. The vibrating or the tamping action of the earlier machines appeared to further overtriturate the mass within the cavity, and condensation was not realized.

Numerous experiments were undertaken to verify the theory that a plashy, or as is commonly known, a "sloppy" mix, is indicated for the start of the filling in order that adaptation may be had. Steel molds, glass tubes and extracted teeth were used in this experiment. Certain identifying marks such as scratches and sharp angles were etched into the molds following the technic advised by Charles E. Woodbury for observation of adaptation. The test fillings, when removed from the various molds, were examined under magnification to determine which consistency of amalgam copied the identifying marks most accurately. It was soon determined that the drier mixes copied the detail much more sharply than the plashy ones.

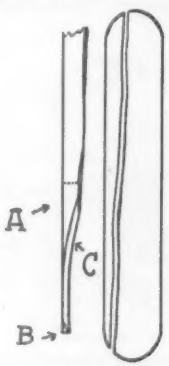

Fig. 2.—Tongue blade, split for wedge. A, handle for convenience. B, triangular form. C, surface curved to follow contour of tooth surface.

This fact led me to the conclusion that the use of a uniformly dry mix from start to finish of the filling would probably result in an amalgam of closer adaptability and greater homogeneity; which would reduce future distortion of the amalgam. Whether this is true or hypothetical, the fillings made in the mouth by following the method of drying the amalgam to a barely workable mass, offering greater resistance to the face of the condenser, resulted in fillings of better quality and appearance with less evident distortion than their neighbors which were condensed in the usual manner of

introducing a plashy amalgam in the cavity at the start. The condensation of drier amalgam is not new. For example, G. V. Black advised:

> A perfect filling cannot be made with soft amalgam because it will spring here and there at every touch . . . a considerable stiffness that will maintain form and a considerable degree of pressure between cavity walls are absolute requisites to success in filling teeth with amalgam.[1]

Throughout the years, I have been making a study of my many failures and have attempted to correlate them with the chemical and physical properties of the amalgam. In this study, I have had the assistance of many professional and commercial people, to whom I am greatly indebted.

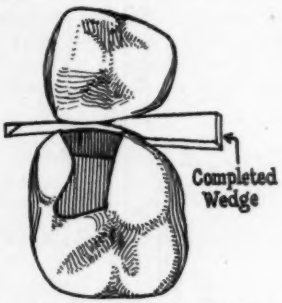

Fig. 3.—Completed wedge tried for adaptation, without matrix band.

MECHANICAL TRITURATION:

In his report on mechanical amalgamation, N. O. Taylor[2] summarized his findings in part as follows:

> These conclusions must not be taken as a wholesale condemnation of mechanical amalgamation. The field is a comparatively new one, and our data point to further study and development of detailed directions for use as a means of making the process useful and valuable.

In the past year, I have experimented with a mechanically controlled triturating device, operating on the principle of a mortar and pestle, using three popular alloys. The feature of the machine is the timing device which automatically stops trituration when amalgamation is completed.

The alloy is comminuted as in a hand-operated mortar and pestle, and amalgamation is realized in seconds rather than in minutes. A uniform mix of amalgam results each time.[3] It is advisable to use the alloy-mercury ratio recommended by the manufacturer. The weighing of the alloy and mercury separately and storing in gelatin capsules (red capsules for the mercury and plain capsules for the alloy) is a handy method. While, in the past, we have used the usual dispensers furnished by the manufacturers in our clinical work, these dispensers are susceptible to the human errors which we have attempted to eliminate from this technic.

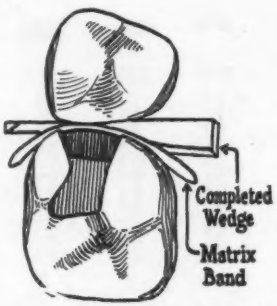

Fig. 4.—Matrix band adapted and wedged into position.

THE PNEUMATIC CONDENSER

The pneumatic condenser is a machine designed for the condensation of gold foil. I have adapted it to amalgam because of the ease with which it can be used in the mouth. It condenses the "dry" amalgam thoroughly, creating the necessary working plasticity, and apparently does not overtriturate the mass within the cavity. The handles are light and small so that actually less room is taken with them than with many of the old hand pluggers. The notable feature of the machine is that a pressure of about 2 pounds must be exerted on the handle before the hammer is tripped. This permits the opera-

tor to arrange the amalgam about to be condensed in the cavity, without activating the mechanism. When the material is in position, a pressure on the handle causes the mallet to operate.

INSTRUMENT SHAPES AND SIZES

Long ago, I found that laboratory technics for packing specimens could not be duplicated in the mouth. The test mold is made of steel and is rigid, while the tooth is less resistant, with a certain amount of elasticity. The test mold rests on a solid foundation, but the tooth is embedded in a resilient membrane which, in turn, is on a movable, unstable and oftentimes impossible foundation.

The laboratory molds are symmetrical.

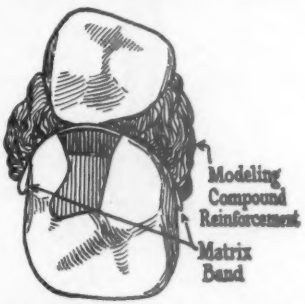

Fig. 5.—Reinforcement of matrix band with modeling compound.

The pluggers fit the molds well, while the tooth cavity is formed of curves, angles and plane surfaces. No two cavities are identical. We have always tried to use the round, curved or triangular plugger-shapes for packing into these sharp and inaccessible angles. The pluggers used in the laboratory are large enough to cover more than half the surface under condensation; while, in the mouth, it is necessary to use small pluggers to reach the acute angles. A small-faced plugger does not condense amalgam, but punches a hole in the previously condensed mass or moves it from one place to another. Many dentists triturate the amalgam carefully with the mortar and pestle and, while packing the filling, use the cavity for a mortar and the ill-fitting pluggers for the pestle, doing a thorough job of overtrituration, with dire results, which we are attempting to avoid.

The customary pluggers available to us are not so designed as to condense the amalgam properly in the angle of the filling formed by the junction of the matrix with the enamel margin. This creates a real paradox in that the weakest section of the filling is apt to be at this point where most amalgam failures occur and where the strongest amalgam is necessary.

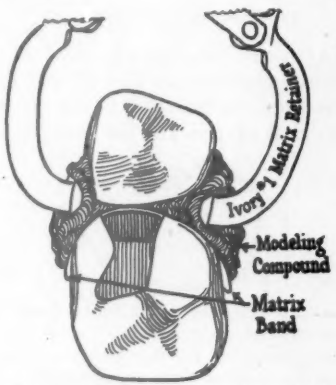

Fig. 6.—Stabilizing adaptation with ivory No. 1 matrix retainer.

In my efforts to duplicate the laboratory method of condensation in the mouth, I realized that condensers had to be designed to fit the cavity in the tooth in the same manner that the pluggers fit the molds used by the physicist. Measurements of cavities in extracted teeth bearing amalgam fillings were taken. By the method of trial and error, a set of six shapes were completed to fit the handle of the pneumatic condenser. A seventh has been added in the past year and other men will undoubtedly add to this nucleus in the future. The five fundamental shapes are illustrated in Figure 1. The other two condensers, which are not

illustrated, are smaller duplicates of No. 1 and No. 2, for use in restricted cavities in bicuspids. The complete set numbers seven. The condenser points are not patented and are made by different manufacturers. An important feature is the shape of the shank, which is slotted so that the condenser point rotates freely in the handle, permitting the condenser face to automatically adapt itself to the various contours of the cavity walls. The ledges (a) in Figure 1 are for the purpose of picking up the undesirable excess mercury as the filling progresses, eliminating this excess at every stage of the packing operation.

CONDENSER POINTS (FIG. 1)

No. 1, the hexagon, is used in the proximal portions of Class II and mesioclusodistal cavities; No. 2, the crescent, in occlusal cavities and the occlusal portions of Class II and mesioclusodistal cavities. The No. 3, or round utility condenser, finds its place in stepping the amalgam after the cavity is filled, aiding in forming the occlusal surface. No. 4, the parallelogram, has a definite place in the condensation of amalgam in the distolingual grooves of upper first molars and in all such cavity extensions. No. 5 is the concave parallelogram for stepping over the overfilled Class V filling to follow the contours of the anterior and bicuspid teeth.

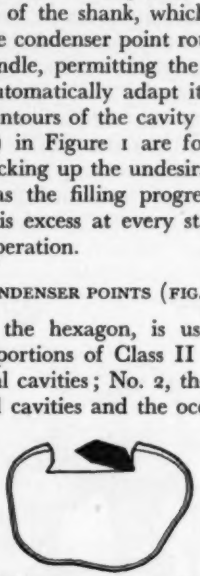

Fig. 7.—Diagram of Class II cavity sectioned through gingival floor. The face of the hexagon point No. 1 is in position to condense within the grooves made for retention.

THE MATRIX

I cannot overemphasize the necessity of a rigid and immovable matrix adaptation in condensing amalgam by machine. The steady pressures exerted during the operation will force a poorly adapted matrix to move, causing a landslide of the previously condensed amalgam. The matrix band must be tightly wedged at the gingival margin and must be well reinforced with modeling compound. The buccal and lingual compound reinforcements should be tightly bound together with an ivory No. 1 matrix retainer, as suggested by Herbert J. Graham, of Sacramento, Calif.

THE MATRIX TECHNIC

1. Contouring of the triangular shaped wedge (Fig. 2) made from an ordinary tongue blade is all important to the finished filling. The wedge serves as a solid wall to strengthen the matrix band and forms the proximal surface of the finished filling. "A casting is as nearly perfect as its mold." The splinter is first quartered so as to have sufficient material to serve as a handle (A) during the shaping process, and is carved to a triangular shape, as at (B), so that the base of the triangle fits tightly to the gingival margin, the apex of the triangle ending below the contact point of the

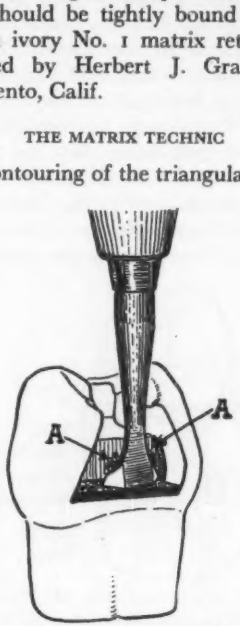

Fig. 8.—Hexagon point No. 1 within cavity, in adaptation to axiogingival angle during condensation of first part of amalgam. A, excess soft amalgam in process of elimination.

opposing tooth. It is then shaped at C to continue the contour of the lingual surface of the tooth.

2. The wedge is tried in position in the mouth (Fig. 3) and, if satisfactory, is removed and set aside for the next step.

3. An untempered steel matrix band 0.002 inch thick is contoured and adapted, about 1 mm. extending above the marginal ridge of the opposing tooth. (Fig. 4.) With the band in place, the wedge is moistened in water to soften the wood and is inserted from the lingual side. The water-softened wedge will adapt the band to small concavities especially on the mesial surface of upper first molars, while the swelling of the wood assists greatly in maintaining separation during the filling operation.

4. Two small pieces of green compound tracing sticks are softened and pressed tightly into the buccal and lingual embrasures. (Fig. 5.) The compound reinforces the band forming the contours anticipated for the finished filling.[4]

Fig. 9.—Diagram of Class II cavity sectioned through gingival floor. The face of the hexagon point No. 1 is in position to condense along the cavity wall and enamel margin.

5. The jaws of an ivory No. 1 matrix retainer are warmed and pressed into the compound reinforcements (Fig. 6), the entire adaptation becoming a rigid unit. The few extra minutes required to form the wedge to the contour desired is saved many times over, as the proximal surface of the filling is completed when the band is removed. An excellent interproximal space is realized, and no carving of the amalgam should be attempted. The use of strips or other abrasives on the proximal surface of the finished filling at any time is contraindicated.

MECHANICAL MANIPULATION OF AMALGAM

Experience has taught us that a mix of 1 gm. of alloy (about 16 grains) can be condensed in from two and one-half to three minutes. As a mix of this size is ample for a moderate sized cavity, to further standardize the technic a mix of 1 gm. of alloy to the specified amount of mercury is always made, regardless of the size of the cavity. In a large cavity, where two or more grams of alloy is indicated, multiple mixes of 1 gm. each may be made during the filling operation, assuring freshly triturated amalgam through the completion of the filling.

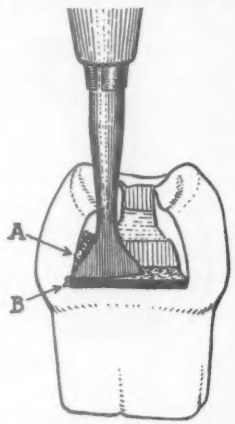

Fig. 10.—Hexagon point No. 1 reversed for effective condensation of amalgam into angle B and along walls of cavity. A, excess soft amalgam in process of elimination.

Such a technic for extensive restorations is used in our clinic rather than the addition of excess mercury prior to trituration in order to keep the mass from hardening during condensation.

Large fillings often require from six to eight minutes or more. An amalgam that has been triturated and rested on the bracket table for another five or more minutes may not be so strong or so nearly uniform as one which has been

condensed during the earlier stages of crystal growth.

The speed and convenience of the mechanically controlled amalgamator have been found advantageous to the "installment plan" of packing when duplicate mixes are indicated during condensation in extensive restorations.

TECHNIC

For the Class II cavity (Figs. 8, 10, 11) two condenser points are selected which best fit the cavity. In this case, the No. 1 (hexagon) was selected for the proximal part, the No. 2 (crescent) for the occlusal part. The contents of a 1-gm. capsule of alloy is triturated with the

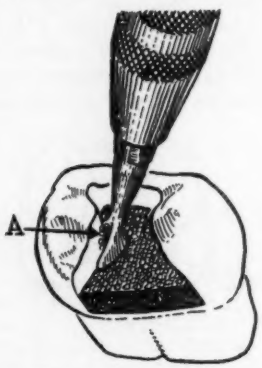

Fig. 11.—Crescent point No. 2 in adaptation to irregularities of occlusal cavity. A, excess soft amalgam in process of elimination.

directed amount of mercury in the mechanical triturating device previously described.

The mix is placed upon the bracket table and divided into five or six parts. The first part is freed of as much mercury as possible by compressing and wringing through a linen cloth with a maximum of finger pressure. This dried portion is pressed into the proximal portion of the cavity and jostled into the desired position with the hexagon point (No. 1), with the long side toward the pulpal wall. (Fig. 7.) Pressure is exerted on the condenser handle to activate the mallet, condensing thoroughly into the sharp angles and locks in the depths of the cavity and removing the excess soft amalgam. (Fig. 8, A.)

The point is now reversed, as in Figure 9. The next dried part of the amalgam is pressed into the cavity and condensed in the same manner, care being taken to pick up the excess plashy amalgam on the ledge of the point at A, Figure 10, as the filling progresses. Thorough condensation of the buccogingival and linguogingival angles is indicated at this time. (Fig. 10, B.) It is not necessary to permit plashy amalgam to remain on the surface of each packed portion, as sufficient mercury is forced down through

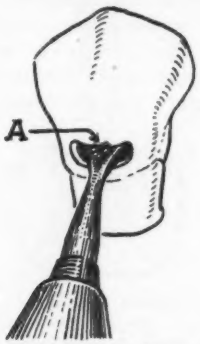

Fig. 12.—Crescent point No. 2 condensing amalgam within Class V cavity. A, excess soft amalgam in process of elimination.

the next and succeeding portions to assure a tight union.

As the filling rises above the pulpal wall or step of the cavity, the No. 1 (hexagon) point is replaced with the No. 2 (crescent), which will finish the packing operation. (Fig. 11.) The shape of the No. 2 point facilitates thorough condensation on the occlusal area, eliminating the excess mercury-rich amalgam at every stage. (Fig. 11, A.) The No. 2 point follows the contours of the cavity walls, forcing the amalgam well into the extended grooves. The same technic of drying the amalgam as thoroughly as is possible with finger pressure

should be continued to the finish of the filling. Extra dry amalgam should not be used on the already dry filling. The surface will appear plastic when completed, but do not attempt to reuse the old overworked and dried-out amalgam pushed from the filling to blot up the supposed excess.

If the technic has been followed, the filling should be left alone when it is completed regardless of the plastic appearance of the occlusal surface. The filling of a cavity of this size should require from two and one-half to three minutes. Removal of the matrix and carving to occlusion may proceed immediately on completion of condensation as the setting will be sufficiently advanced. Once more I repeat that if the matrix has been adapted as outlined, it is not advisable to use carvers or burnishers on the gingival margin or proximal surface. The smoothness given to this surface by the polished matrix band is greater than is ever possible with strips and carvers. The interproximal space and gingival margin are now complete.

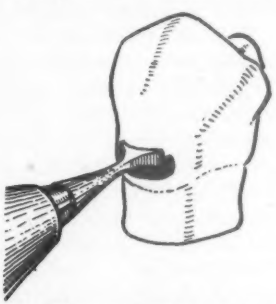

Fig. 13.—Diagram showing concave parallelogram No. 1 in position for contouring of overpacked Class V filling.

CLASS V AMALGAM FILLING

The numerous failures of this type of filling may be traced to the "bulging" of the amalgam. With the usual amalgam pluggers and an extended, shallow cavity of this class, it is impossible to condense thoroughly and eliminate the excess mercury, which, it is conceded, creates excessive expansion and the bulging effect. In the Class V cavity, it is imperative that the amalgam be packed as nearly free of excess mercury as possible. Either the No. 1 or No. 2 point or one which covers the floor of the cavity to the greatest extent is now selected (Fig. 12) and we proceed as outlined for Class II, eliminating the excess plastic amalgam from each part under condensation as in Figure 12, A and continue to the overfilling. When the cavity is excessively overfilled, we change to the concave parallelogram No. 5, the face of which is concave to approximately follow the convex surface of bicuspids and anterior teeth. (Fig. 13.) Care must be taken to have a substantial excess of amalgam covering the margins before employing the No. 5 stepping condenser. It must be remembered that the enamel rods in this area become progressively shorter as the cemento-enamel junction is approached. This No. 5 point is not intended for use within the cavity.

MARGINAL ADAPTATION

In nearly all of the hand-packed amalgam fillings made in our clinic, a definite opening of the margins can eventually be detected. By control of the amalgam manipulation with mechanical aids and improved condenser points, we have reduced the height of the marginal line. The raised margins of the mechanically condensed fillings are more difficult to see, but they do occur. We are not certain why, but every clinician knows they do occur, so the reasons must be left to the metallurgists, in the hope that they may solve this remaining difficulty in amalgam technic and that, in due time, the American Dental Association Research Commission will be able to provide against such phenomena by means of a specification requirement.

One must dry the fillings thoroughly with compressed air and use binocular loupes to detect many of the margins of

malleted fillings. A sharpened explorer point will also be of great assistance. When interpreting an inspection of this type, one must be certain that the margin was absolutely flush with the tooth when the filling was polished. Only by keeping accurate clinical records can one clearly observe the action of amalgam fillings in the mouth.

From time to time, as I inspected my amalgam fillings, I wondered how much the margins had lifted or opened. I obtained some thin shims, or "feelers," used by mechanics in setting distributor points, valves, etc., to measure these margins.

The thinnest was approximately 40 microns thick (0.0015 inch). By raking the explorer point over this shim, which was placed adjacent to and in contact with the raised margin, or by pressing the edge into the open margin, I could get a relative idea of the magnitude of the change.

When making periodic inspections of fillings, I have noticed that little or no raising of margins occurs at the gingival third of the Class II fillings; while, at the occlusal third of the same surface, I have occasionally found distortions equal to the thickness of the 0.006 inch blade on the set of feelers. It has often occurred to me that the greater the undercuts, the less the visible distortion. It is difficult to obtain retention grooves near the occlusal surface without weakening the enamel walls or cusps, while the gingival part of the cavity may be undercut extensively.

From clinical observations, it appears that a study of the distortion of amalgam should be associated with a thorough study of a special cavity preparation for amalgam fillings.

POLISH AND TARNISH OF AMALGAM

The polishing of the filling is important. R. Ottolengui[5] reported on 1,000 amalgam fillings examined in 1925, 95 per cent of which were not polished. He stated that of the 10 per cent which were polished, none showed a recurrence of decay as far as he could determine without removing the fillings from the teeth.

Polishing may be overdone by the creation of heat during the operation. Arthur W. Gray[6] showed that the amalgam loses strength gradually as the transition point of about 70° C. is reached and very rapidly between 70 and 80° C. Such temperatures are possible when polishing agents are employed in a dry condition.

By close observation of the fillings made by hand and by machine, it appears that the mechanically condensed fillings tarnish less. Most of the amalgam fillings in the mouths of our patients tarnish, and many actually reach a stage of corrosion if mouth hygiene is neglected. Very often, during our periodic examinations, we note in a mouth one or two fillings which have tarnished, while all others in the same mouth are lustrous. Investigation of the patient's toothbrush habits proves that they habitually fail to brush the tarnished fillings. While many investigators believe that the presence of gold and amalgam in the same mouth causes the amalgam to tarnish, I have yet to see an amalgam filling (made by myself or my assistants) tarnish more than usual in the presence of the gold, provided mouth hygiene was maintained.

My observations of tarnished fillings lead me to believe that the commonest cause of amalgam tarnish is the carelessness of the patient as regards oral cleanliness.

FLOW

My experience here has been limited to the so-called high silver amalgams of the type which comply with the requirements of the American Dental Association Specification No. 1 for Dental Amalgam Alloys.

The three alloys used in my tests for evidence of flow in the mouth may be identified as A, B and C. One is re-

corded as being low in flow, while the other two are very high, probably eight times higher. Yet, when I placed these alloys in the mouth side by side, none of them showed any detectable or appreciable amounts of flow from biting stress even though the opposing teeth struck parts of the fillings hard enough to cause facets on the fillings.

Fillings made for this experiment were condensed both by hand and by machine, with the three alloys.

It is my opinion that the 4 per cent flow allowed by the Research Commission is adequate for clinical purposes. Consequently, it follows that no evidence of flow from attritional force should be found, whether the condensation is accomplished by hand or by machine, regardless of the difference in this property as indicated in the physical tests.

My observations of amalgam fillings in the mouths of patients lead me to believe that many failures are due to a confusion as to proper manipulation of the material, from the multiple sets of directions for use of the many different alloys, directions which it may be difficult for the busy dentist to follow; and not to carelessness, as has been asserted. My clinical experimentation with amalgam has been undertaken with a view to standardizing a technic which can be used with all alloys by any dentist, realizing a superior filling, equal to or better than the gold inlay, and requiring no more time than the usual uncontrolled amalgam technic. If a dentist is accustomed to devoting but fifteen minutes to an amalgam filling, he can make a better fifteen-minute filling with this technic; or if he is in the habit of spending an hour on a filling, he can make a better one in that length of time. The time used on the filling depends entirely on the operator.

SUMMARY

1. Controlled and automatically timed mechanical amalgamation, operating on the principle of the mortar and pestle, assures uniform mixes of amalgam.

2. Condensation of amalgam employing the pneumatic condenser permits the operator to condense the amalgam in a less plastic state.

3. The excess of plashy, mercury-rich amalgam is expressed during the progress of the filling by the use of specially designed condenser points, which are not patented, fitting the tooth cavity as the pluggers fit the symmetrical molds used in the physical laboratory.

4. Distortion of the mechanically condensed fillings in the mouth appears to be less than in those packed by uncontrolled hand methods.

5. Tarnish of amalgam is greater in mouths in which oral hygiene is neglected. The presence of gold in the same mouth does not appear to influence the discoloration of amalgam.

6. No clinical evidence of flow from biting stresses has been observed in the mouth even though alloys of high flow (as interpreted by the physical properties tests) have been used. This holds true both for fillings made by hand and for those made by machine.

7. A carelessly made amalgam always fails. A carefully made amalgam makes a filling of the highest order. The time consumed is essentially the same.

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TORUS PALATINUS: A STATISTICAL STUDY

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STUDY of the dental literature indicates the confusion that exists relative to *torus palatinus*. Percentages of occurrence varying from 0.2 to 88 per cent are reported by various investigators.

DEFINITION AND SCOPE

Dorland defines *torus palatinus* (BNA) as "a protuberance on the hard palate at the union of the intermaxillary and palatomaxillary sutures." Stedman defines torus palatinus (BNA) as "palatine torus or protuberance; a bony swelling sometimes present upon the median line (median palatine suture) of the roof of the oral cavity." (Fig. 1.)

In this study, torus palatinus is considered from the clinician's viewpoint; namely, as a hard, solid elevation, essentially bony, situated in the region of the median palatine suture and extending laterally from it. Since the study is based on examination of patients in the clinic and not on dry skulls, the soft tissues overlying or covering the bony growth are, of necessity, included in measurements of size.

HISTORY

Torus palatinus was recognized in the early part of the nineteenth century as an exostosis in the midpalatine region. The first known record of this condition appeared in 1814, in a description by Joseph Fox.[1] However, special credit is due George Carabelli,[2] a dentist of Vienna and St. Petersberg, who, in 1842, gave a comprehensive description of this structure.

Some early investigators associated torus palatinus with lues. Diday,[3] in 1850, regarded the median palatine protuberance as merely a natural conformation which occurs normally in many individuals. However, he added that the torus was a form of exostosis. Duplay and Follin,[4] in 1875, regarded the condition as a defect of conformation. Kupffer and Bessel Hagen[5] introduced the term torus palatinus in 1879.

Gayraud[6] is to be mentioned here for having treated the subject of median palatine exostosis, in 1884, in an article in which he quotes Toirac. The latter called attention to the fact that the condition was a spontaneous and progressive growth in the median palatine region without any appreciable morbidity. Gayraud agreed with Toirac and Duplay that the protuberance in the median palatine region is more a deviation of conformation than a manifestation of any morbid diathesis.

The subject remained in obscurity until Stieda[7] published his excellent monograph, in 1891, in which he treated of this condition in detail.

The first references on the subject of torus in the archives of English medical literature appeared in London in 1909, when Mr. Godlee[8] (later Sir Rickman John Godlee) read an excellent paper in which he presented a comprehensive treatise on the torus palatinus before the Royal Society of Medicine.

This anatomic variation was also observed and mentioned by Lissauer,[9] Calori,[10] Merkel,[11] Tarenetzky,[12] Moral

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TABLE 1.—DISTRIBUTION OF TORUS PALATINUS BY AGE AND SEX.

AGE	TORUS PALATINUS								NORMAL		TOTAL CASES EXAMINED		
	SLIGHT		MODERATE		MARKED		TOTAL						
SEX	M	F	M	F	M	F	M	F	M	F	M	F	
UNDER 5	1	1	–	–	–	–	1	1	39	39	40	40	80
5–9	7	12	1	–	–	–	8	12	30	30	38	42	80
10–14	4	6	1	–	–	–	5	6	29	40	34	46	80
15–19	2	16	2	6	–	1	4	23	22	31	26	54	80
20–24	7	6	1	5	–	1	8	12	32	28	40	40	80
25–29	4	6	–	6	–	2	4	14	33	29	37	43	80
30–34	7	11	–	4	1	1	8	16	26	30	34	46	80
35–39	5	8	–	6	1	2	6	16	40	18	46	34	80
40–44	5	4	1	3	–	5	6	12	37	25	43	37	80
45–49	7	9	3	6	–	1	10	16	36	18	46	34	80
50–54	6	5	4	6	2	3	12	14	35	19	47	33	80
55–59	5	5	2	3	2	5	9	13	44	14	53	27	80
60–64	4	6	2	2	–	2	6	10	43	21	49	31	80
TOTAL	64	95	17	47	6	23	*87	*165	446	342	*533	*307	1,040

TABLE 2.—AGE, CLASSIFICATION AND NUMBER OF CASES.

AGE	TORUS PALATINUS				NORMAL	TOTAL CASES EXAMINED
	SLIGHT	MODERATE	MARKED	TOTAL		
UNDER 5	2	–	–	2	78	80
5 – 9	19	1	–	20	60	80
10 – 14	10	1	–	11	69	80
15 – 19	18	8	1	27	53	80
20 – 24	13	6	1	20	60	80
25 – 29	10	6	2	18	62	80
30 – 34	18	4	2	24	56	80
35 – 39	13	6	3	22	58	80
40 – 44	9	4	5	18	62	80
45 – 49	16	9	1	26	54	80
50 – 54	11	10	5	26	54	80
55 – 59	10	5	7	22	58	80
60 – 64	10	4	2	16	64	80
TOTAL	159	64	29	252	788	1,040

AVERAGE AGE AND RANGE

MEDIAN	32.1	40.0	47.5	35.9

and Frieboes,[13] Testut,[14] von Mikulicz and Kuemmel,[15] Herbst and Apffelstaedt[16] and others.

OCCURRENCE

Torus palatinus occurs frequently in adults of both sexes, in all stages of life;

among all races, primitive or civilized, prehistoric or modern, but not in the same frequency. It may affect many members of a family.

Torus palatinus is present in the cynocephalus babuin and absent in the anthropoids. The gorilla, chimpanzee, lemur and monkey do not present it. However, the baboon presents a median ridge in the palate which may suggest a torus.

Dorrance[17] states that the torus begins to attain an appreciable size after puberty, after which it gradually and steadily enlarges until the age of thirty. After this age, he says, the growth ceases, but change in shape may follow. Martin regards the torus as a postnatal hyperostosis of the *processus palatinus* bordering on the median palatine suture. On the other hand, the torus is considered by Hooton[18] to be the result of environmental adaptation, being dependent on excessive development of the masticatory mechanism, a condition which results in pressure toward the median palatine region. The thickening of the palatine vault on each side of the median palatine suture, in his opinion, affords a buttress to resist this pressure.

TABLE 3.—DISTRIBUTION ACCORDING TO AGE OF COMBINED GROUP.

AGE	PERCENTAGE		
	TORUS PALATINUS	NORMAL	TOTAL
UNDER 5	2.5	97.5	100.0
5 - 9	25.0	75.0	100.0
10 - 14	* 13.8	86.2	100.0
15 - 19	* 33.7	66.3	100.0
20 - 24	25.0	75.0	100.0
25 - 29	22.5	77.5	100.0
30 - 34	30.0	70.0	100.0
35 - 39	* 27.5	72.5	100.0
40 - 44	22.5	77.5	100.0
45 - 49	32.5	67.5	100.0
50 - 54	32.5	67.5	100.0
55 - 59	27.5	72.5	100.0
60 - 64	20.0	80.0	100.0
AVERAGE	* 24.2	75.8	100.0

Percentage of Population with Torus Palatinus.

DESCRIPTION

Torus palatinus varies from a mere uniform crest to a prominence occupying two-thirds of the palate. It may be symmetrical or asymmetrical. In the latter condition, it is but a variation in conformation, yet may be so extensive as to suggest exostosis. Hyperostosis would be a more descriptive term, since exostosis is commonly used to suggest a morbid growth.

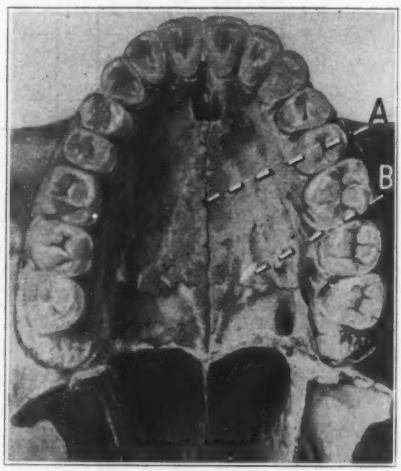


Fig. 1.—A, median palatine suture. B, palatomaxillary suture.

The consistency of the torus palatinus is that of spongy bone, produced by the downward enlargement of the diploe. The palatine plates are not bent, the floor of the nose remaining flat or perhaps slightly curved to a normal extent. Rauber,[19] Godlee[8] and Franke[20] agree with this.

METHOD OF STUDY

The data were compiled from the examination of persons applying for treat-

ment at New York University Dental Clinic, except for the group from birth to 5 years, which were obtained from the Yorkville Kips Bay Health Center, through the courtesy of Harry Strusser, chief of the dental division of the Department of Health of New York City. The subjects of the study, although applying for dental treatment, constitute a valid sample since more than 90 per cent of the population is in need of dental care.

The presence or absence of torus palatinus was noted. For convenience, the torus was classed as slight, moderate or marked. (Fig. 2.) The case number, age, sex and the number of teeth present in the maxillae were also recorded.

In order not to give undue weight to any age group, an equal number of cases for each category were selected at random from the accumulated data. Persons 65 years of age and over were excluded from all the tabulations and calculations because they represented approximately only 2 per cent of the age distribution of the clinic and were too few to make up a valid sample.

RESULTS

Table 1 shows the distribution of torus palatinus according to age and sex. Of a total of 1,040 cases studied, 533 were male and 507 female. Of this number, there were 165 females to eighty-seven males with torus palatinus.

Table 2 presents a modification of Table 1, with a distribution according to age of the combined group, disregarding sex. It will be noted that torus palatinus rarely occurs under the age of 5. In this particular study, only two such cases were recorded and these were of slight degree. This would tend to corroborate Koerner's report that torus palatinus occurs in 2.44 per cent of male infants and 2.18 per cent of female.

TABLE 4.—SUMMARY OF PERCENTAGE DISTRIBUTION OF TORUS PALATINUS AND MALE TO FEMALE RATIOS.

			TORUS PALATINUS				NORMAL	TOTAL CASES EXAMINED
			SLIGHT	MODERATE	MARKED	TOTAL		
A	NUMBER OF CASES	MALE	64	17	6	87	446	533 (51·2%)
		FEMALE	95	47	23	165	342	507 (48·8%)
		TOTAL	159	64	29	252	788	1,040 (100·0%)
B	PERCENTAGE OF TOTAL CASES EXAMINED	MALE	12·0	3·2	1·1	16·3	83·7	100·0
		FEMALE	18·7	9·2	4·4	32·3	67·7	100·0
		TOTAL	15·3	6·1	2·8	24·2	75·8	100·0
C	-RATIOS- MALE TO FEMALE		2 TO 3	1 TO 3	1 TO 4	1 TO 2		

In the age group of from 5 to 9 years, inclusive, there occurs the greatest number of slight tori; which leads us to conclude that the torus first appears somewhere in this age group. In analyzing this group, it was found that 7 was the average age for the beginning of torus palatinus.

Table 2 also shows that there is a gradual decrease in the number of cases of slight torus as age increases. This fact may be more readily discerned from the curve for slight torus palatinus in Figure 3. The median or average age for patients with slight torus palatinus is 32.1 years.

The moderate type of torus palatinus does not occur to any appreciable extent until the age group of 15 to 19 is

reached, there being only two cases of this type under that age. The trend of distribution, as indicated in Figure 3, shows a gradual increase in the number of moderate cases of torus palatinus with age. The average or median age for this type was found to be 40 years.

The distribution of marked torus palatinus (Table 2) indicates that this type does not occur to any appreciable extent until the age group of 25 to 29 inclusive is reached, there being again only two cases below this age. The trend as a whole for marked torus palatinus shows a gradual increase in the number of these cases, with an increase in age as shown in Figure 3. The median or average age for marked torus palatinus was found to be 47.5 years.

Considering all three types of torus, the average age in which this condition occurs is 35.9 years. The middle 50 per cent of torus palatinus as a whole is between the ages of 20.8 and 50.2. This average age holds true for both sexes.

Table 3 shows the percentage distribution of torus palatinus in relation to the percentage distribution of the normal palate in the population sample. Excluding the very low percentage of the age group under 5 years, it may be seen that the percentages vary from a minimum of 13.8 to a maximum of 33.7.

Dorrance[17] quotes Hermann Prinz as saying that torus palatinus occurs in at least 10 per cent of the population after the age of 30. It may be shown from our report that the average percentage of torus palatinus after the age of 30 is 27.5. Frank Fox has also observed it in a frequency of 10 per cent in patients presenting themselves for treatment in the department of prosthetic dentistry of the Evans Institute. Our records show the average percentage for torus palatinus in all ages to be 24.2. Some may contend that the difference in percentages is due to the special type of patient coming to the prosthetic clinic. In another study, we have found that there is no correlation whatsoever between the number of teeth present in the maxillae and the occurrence of torus palatinus. This correlation study also included edentulous patients.

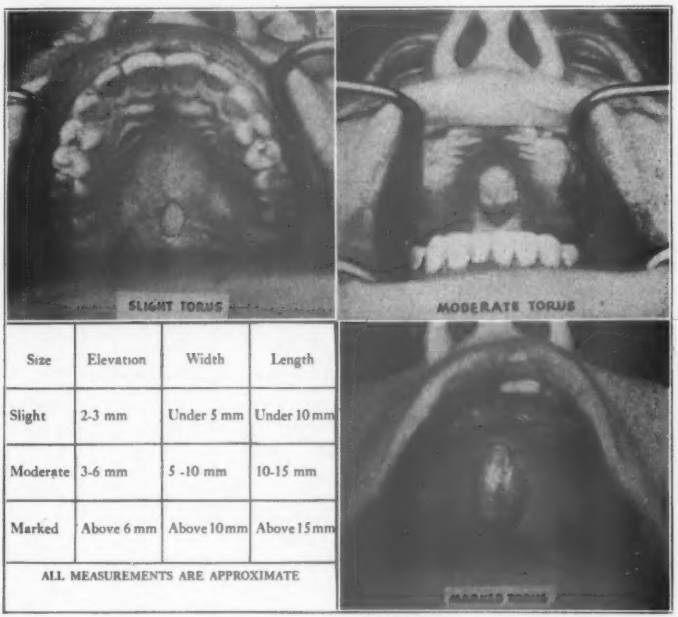
TABLE 5.—DIFFERENCES BETWEEN AVERAGE AGES IN TYPES OF TORUS PALATINUS AND THEIR SIGNIFICANCE.

	TORUS PALATINUS		
	SLIGHT	MODERATE	MARKED
MEDIAN	32.1 YRS.	40.0 YRS.	47.5 YRS.
DIFFERENCE BETWEEN MEDIANS AND STANDARD ERRORS	7.9 ± S.E. 2.3		
		7.5 ± S.E. 2.9	
SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE AVERAGE AGES OF THE THREE TYPES OF TORUS PALATINUS	DIFFERENCE = 3.4 S.E. ODDS AGAINST OCCURRENCE 1,483 TO 1 PROBABILITY OF OCCURRENCE 67 OUT OF 100,000 CASES		
		DIFFERENCE = 2.6 S.E. ODDS AGAINST OCCURRENCE 106 TO 1 PROBABILITY OF OCCURRENCE 93 OUT OF 10,000 CASES	

Table 4 summarizes all our statistical data. It also includes a comparison and ratio of the male and female cases of torus palatinus by percentage and according to type. From this table, we see that, of the 533 male cases examined, 12.0 per cent evidenced slight torus palatinus, 3.2 per cent had moderate torus and 1.1 per cent presented marked torus; a total of 16.3 per cent torus palatinus for males. Of the 507 female cases examined, 18.7 per cent presented slight torus palatinus, 9.2 per cent showed moderate torus and 4.4 per cent had marked torus; a total of 32.3 per cent torus palatinus for females. In both sexes combined, in a total of 1,040 cases, there were 15.3 per cent with slight torus palatinus, 6.1 per cent moderate and 2.8 per cent marked; a total of 24.2 per cent with torus palatinus.

Table 4 also shows that the ratio of male to female is 2:3 for slight torus palatinus, 1:3 for moderate and 1:4 for marked; an average ratio of 1:2 for all types of torus palatinus. This coincides with Lachmann's[14] report of the predominance of torus palatinus among females (25.39 per cent to 11.94 per cent for males). Hermann Prinz also states that torus is more common among women.

Table 5 presents the differences between the average ages of the types of torus palatinus and their significance. The difference between the median, or the average ages of slight torus palatinus, and moderate is 7.9 years plus or minus a standard error of 2.3 years. This difference of 7.9 years is equal to 3.4 times the standard error of deviation. This may be considered as significant and not due to chance. The odds against the occurrence of such a deviation in the average ages are 1,483:1; that is, if we were to undertake 100,000 such studies



Size	Elevation	Width	Length
Slight	2-3 mm	Under 5 mm	Under 10 mm
Moderate	3-6 mm	5 -10 mm	10-15 mm
Marked	Above 6 mm	Above 10 mm	Above 15 mm

ALL MEASUREMENTS ARE APPROXIMATE

Fig. 2.—Slight, moderate and marked torus.

of torus palatinus, in only sixty-seven of these studies would there be such a deviation as great or greater than 7.9 years in the average ages between slight and moderate torus palatinus. The same applies to the difference between the average ages of moderate and marked torus palatinus. Here again, the difference is significant and not due to chance, as is indicated in Table 5.

SUMMARY

Since the difference in the average ages of the three types is not due to chance, we may logically conclude that the deviations are caused by the progressive growth of the torus palatinus (average age, 32.1 years for slight; 40.0 for moderate, and 47.5 for marked). The fact that it grows is further supported by the data presented in Table 2. Moderate cases of torus palatinus do not appear before the age of 15 except for the two isolated cases below that age. Marked cases of torus palatinus do not appear before the age of 25 except for the two isolated cases below that age.

Evidence gathered from the histories of patients leads one to conclude that the growth must have been gradual, because few persons are aware of the presence of the torus as an abnormal growth. If it had appeared suddenly as a moderate or marked growth, it would be reasonable to assume that the patient would have apprised the dentist of the condition.

Because of its size, the sample from ages 65 to 75 was omitted. However, it was interesting to note that all the tori that were found in this group were of the moderate and marked varieties. This fact may be considered as added proof that the torus appears to grow.

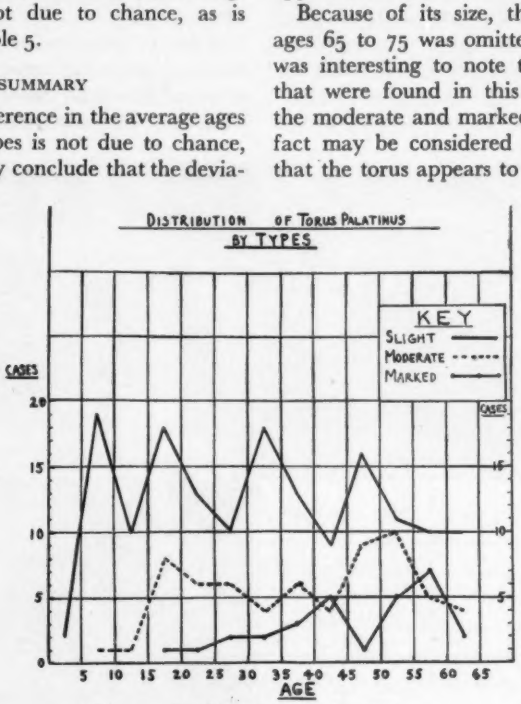


Fig. 3.—Distribution of torus palatinus.

To refer to Table 2 once more, one can see in the total column that, except for the period from 10 to 14, the number of tori remains fairly constant. Since the totals up to 15 years of age were not consistent, it was deemed advisable to get a larger sample for this group and to resolve it into one-year periods in order to determine whether this figure was due to chance. This was done and nothing of any significance was found. We cannot explain this variation in any way.

Another study was made to determine

whether the 1 :2 ratio of male to female had some effect upon the tables. Upon separating the sexes and plotting graphs for each, it was found that this ratio did not affect the results in any way.

CONCLUSIONS

1. The occurrence of torus palatinus before the age of 5 is rare.

2. This condition first appears as a slight torus at about the age of 7.

3. The average age of the population with torus palatinus is 35.9 years.

4. The middle 50 per cent of the cases of tori is between 20.8 years and 50.2 years.

5. The average percentage of torus palatinus in the population is 24.2 per cent.

6. The ratio of torus palatinus in male to female is 1 :2.

7. Torus palatinus appears to grow progressively.

8. The average time elapsed to grow from slight to moderate is 5.7 years; from moderate to marked, 8.4 years.

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THE JOURNAL *of the* AMERICAN DENTAL ASSOCIATION

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DECEMBER *Editorial Department* 1940

THE SPIRIT OF BENEVOLENCE

THE approaching Christmas season is the period of the year when the spirit of benevolence is aroused in the heart of every one who possesses any of the milk of human kindness. Believing this to be an instinctive characteristic of civilized man, even though it would seem that a large part of the world has renounced any such heritage, we appeal to that instinct in every dentist, asking that he contribute in his measure to what we believe to be the noblest benevolent cause within his province—that of the Relief Fund of the American Dental Association, which looks to this spirit and at this time of the year for its main support and encouragement for the continuance of an institution that has become the pride of every dentist who loves his fellowman.

Conceived in the hearts of a group of dental practitioners who had witnessed numerous instances of distress and who had personally participated in relief to the many unfortunates, the Relief Fund has been nurtured through prosperous and lean years to where it has today become a source of relief to many who would otherwise have felt the actual suffering of privation and want.

Each year for the past twenty-seven years, the membership has been called upon for a voluntary contribution to this worthy cause, in the purchase of Christmas Seals through the American Dental Association; and even though compliance with the appeal has been purely on a voluntary basis, the response has been magnificent. Only one dollar is requested, and for this one dollar the contributor receives one hundred Christmas Seals, each one of which is a symbol of the spirit of benevolence and of an inner satisfaction that appeals to everything noble in his character.

Supplementing the seal appeal, which is only to the individual, is that to the state and local components of the American Dental Association; almost every state and component society having contributed cheerfully to this benevolent fund, until today we have accumulated, through the constant efforts of the Relief Fund Committee, a fund that is unique in professional organizations and one that is meeting a need that can best be met on a benevolent basis. The stability of this Fund is beyond question attributable to the enduring spirit of benevolence that is inherent in all of us.

Early in his dental career, the writer was impressed with the need of such an emergency fund as the Relief Fund from the stories that were circulated of the financial circumstances of some of the patriarchs of the time, and to say that such stories were distressingly disheartening to one who had just entered the profession is but expressing the feeling mildly. Practitioners who had had reputedly lucrative practices and reputations for contributions to the educational and professional progress and advancement of dentistry became dependent in their declining years mainly because of the sacrifices they had made for the young and growing profession. One has but to read the lives of hundreds of our patriarchs of the developing period to realize their sacrifices and to experience a personal benevolent determination to aid in avoiding such eventualities in the future. It is to this humanitarianism, which is the essence of true professional spirit in each member of the dental profession, that we appeal, asking him to contribute as freely as is within his means to the noblest cause of all.

This appeal does not in any manner reflect discredit on the responses of the past: it is simply an effort to enlarge the scope of the activities of the Relief Fund Committee and the Relief Commission. It may be timely to interpolate here a differentiation between these two bodies for the information of those who do not understand the constitution and

activities of them. Briefly stated, the personnel of the two bodies is practically the same. The Relief Fund Committee is charged with the collection of the Relief Fund, and the Relief Commission is charged with the administration of the Fund.

As a matter of equity, from the standpoint of participation, each constituent society to which a beneficiary belongs must, as a society, contribute an equal amount to that contributed by the A. D. A. Relief Commission, a provision the wisdom of which has been confirmed many times in the past.

From the conception of the idea and from the time when efforts were initiated to collect the fund, it was twelve years before it was felt that the fund was sufficiently large to draw upon it. The first payment from the Relief Fund was made in April 1925, and up to October 31, 1940, 291 persons have received assistance. The amount expended during this period totals $103,262.76 for the Association, and as corresponding amounts have been paid by the various states, the grand total amounts to $206,525.52. At the present time, forty-nine persons are receiving assistance, and the total monthly payments are approximately $1,000, an average payment of about $20 a month. As the state and local societies give similar amounts, the full monthly payments average about $40 per recipient.

Yearly, the Relief Fund is assisting more and more of our members and their families. Six years ago, the number of applicants for relief was only twenty-three. In the past year, there were seventy-two applicants. In 1934, members of only sixteen state societies participated. This year, the number was increased to thirty states.

The Relief Fund is now nearly a half million dollars, which is invested in high-grade bonds; the approximate earnings last year being slightly over $20,000.

The sizeable proportions of the Relief Fund at present show what can be accomplished through organized effort. For the support of the many other beneficial projects of the American Dental Association, the House of Delegates voted to increase the dues at Cleveland; however, the dues are still sufficiently low as compared to similar national organizations to fully warrant generous contributions to this fund from every member.

The enduring thanks of every member of the Association go to those three noble men who were instrumental in establishing the fund, Edward S. Gaylord, W. T. Chambers and L. G. Noel, as well as to the present members of the Relief Commission and Relief Fund: Charles P. Grosby,

St. Louis, chairman of the Relief Commission; Fred R. Adams, New York, chairman of the Relief Fund Committee; E. E. Graham, Chicago, secretary of both committees; Olin Kirkland, Montgomery, Ala.; W. S. Thompson, Los Angeles, Calif., and John S. Owens, Camden, N. J.

Each year, the demands upon the Relief Fund are increasing, and we urge each member to continue to contribute increasingly each year. The seals have been sent out, and returns are coming in rapidly, but just as an earnest of cooperative encouragement to the men who are so generously giving their time and energy to this cause, we urge every member to make an additional contribution for this year. Every one will appreciate it, and most of all will appreciation come from those so unfortunate as to have to rely upon this Fund.

YOUR DENTAL ALUMNI SOCIETY

EVERY dentist in full practice today realizes the desirability of maintaining contact with the various educational institutions as a definite source of aid in keeping pace with the advancement of the various phases of dental practice.

To that end, the various institutions foster postgraduate courses, refresher courses, clinics and organizations within their student bodies and among their graduates. We have in mind particularly, at the moment, the many advantages to be gained by the older graduate as well as the newer one from membership in the alumni society of his particular school.

The confining character of the practice of dentistry and its demands upon the time and attention of the young graduate—that is, after he has been in practice long enough to feel confined—tend to divert him from his student-day resolutions to keep up with the advances of the profession, and he soon begins to lose step in the various lines of activity. It is not long, however, before he realizes the desirability and need of some sort of postgraduate work, and it is here that the alumni society, which he has probably neglected, may come to the rescue in offering him a source of contacts and postgraduate education that will keep him refreshed, as it were.

The academic and technical preparation that the young graduate has undergone in fitting himself for entrance into the profession is, as is all other educational effort, intended to serve only as a foundation upon

which to build the superstructure of future success, and it is axiomatic in the health professions that one must keep in touch with the sources of knowledge if he is to avoid the strangling and confining influences of routine practice. This is particularly true of dentistry. In other words, the graduate, of whatever year, must keep in touch with professional educational efforts if he is to keep up with his brothers in practice. And we know of no better, simpler, more economic and agreeable manner of achieving up-to-dateness on the part of the dental graduate than through membership in his alumni society and frequent pilgrimages to the meetings thereof.

Almost every dental school has a live and virile alumni society, but it is difficult, not to say discouraging, for those promoting the society to maintain its virility without the cooperation of its graduates. These societies are sponsored and fostered by the schools for just the purpose here indicated; namely, sustaining interest in the progress and advancement of dentistry. Lectures, clinics and postgraduate courses are quite generously offered; and what better method could be devised for postgraduate teaching and for reviving the enthusiasm and interest of studenthood than postgraduate instruction in the surroundings where one, as a student, experienced his first professional dreams and aspirations? The problems of dental practice today are quite different from those which confronted the graduate of even a few years ago, demanding the consideration of practitioners abreast with the improvements and advancements in dental practice.

The practice of dentistry, in the nature of the case, is more or less narrowing in its demands, and it is quite easy for one who yields to these influences to fail to keep pace with the continuous progress of dentistry. Developments in other and related fields are creating new and more serious demands upon dentistry, making it necessary for the dental practitioner to exert every effort toward keeping up with the advancement of his profession.

Dentistry as a profession owes its inception to the general realization of the broad principle of cooperation, helpfulness and an exchange of knowledge and experience as embodied in the motives and objectives of the dental society. The benefits to all of organized dentistry through the society are numerous, but the most tangible are those to be derived from keeping pace with the advancement of dentistry, and it is in the society that we have recorded all dental progress of whatever character.

The Sage of East Aurora once said that "men are valuable just in

proportion as they are able and willing to work in harmony with others," and we know of no better exemplification of the truth of this statement than is found in the dental society and the dental alumni association.

The recent graduate is the product of the highest development of dental educational training, but the public will not accord to him any special privileges because of that fact. On the contrary, more will be demanded of him, and it becomes compelling that he keep in touch with the development of dentistry both in its character and in its direction.

Join your alumni society and attend its meetings as often as you can. It will be a source of inspiration and help, more than compensating for the time and energy expended.

CONGRESS ON DENTAL EDUCATION AND LICENSURE

THE Council on Dental Education of the American Dental Association is planning a congress on dental education and licensure to be held at the Stevens Hotel in Chicago at the time of the Midwinter Meeting of the Chicago Dental Society, February 15, 1941. This congress will be the first national meeting in this country devoted to the common problems of teaching and examining in the field of dentistry.

The congress will be devoted to discussion of the related problems of dental education as carried on by the dental schools and the licensing of dental practitioners as carried on by the dental examining boards. The Council on Dental Education expects that much benefit will accrue to both the dental faculties and the examining boards through the closer understanding of their common problems made possible by the proposed Congress.

The program of the congress will be found in another department of THE JOURNAL.

DEATH OF DR. ALBERT HALLENBERG

It is with exceeding sadness that we announce the death of Dr. Albert Hallenberg, of Fargo, N. D., a Trustee of the American Dental Association, which occurred on Sunday, November 17.

An obituary will appear in an early issue of THE JOURNAL.

BIBLIOGRAPHICAL

Complete Dentures

By MERRILL G. SWENSON, D.D.S., Professor of Prosthetic Dentistry, New York University, College of Dentistry, with the collaboration of Vincent R. Trapozzano, D.D.S., Associate Professor of Prosthetic Dentistry, New York University, College of Dentistry. Cloth. 736 pages; 905 illustrations. St. Louis: The C. V. Mosby Company, 1940.

In this new book, the plan of procedure is to present the technical phases of full denture construction step by step with photographic and diagrammatic illustrations for each of them. The volume is divided into five parts. Part I deals with a description of the technical procedures involved in the construction of full dentures presenting no unusual problems. Here, one finds an adequate explanation of the author's method of taking impressions, making models and baseplates, the use of the articulator and facebow and setting the teeth, concluding with the finished denture. Part II deals with the particular problems involved in immediate denture construction and, here again, a case is carried through completely, including the surgical reduction of the maxillary ridge. The considerations which are of importance in relation to the construction of any full denture are discussed in Part III. Here, one finds applied anatomy and physiology of the jaws, diagnosis and the planning of the proposed treatment, methods of obtaining and registering jaw relations, arrangement and selection of teeth and other pertinent material. In Part IV and Part V, various minor technical procedures are described and discussed.

Throughout the volume, an effort is made to illustrate the discussion with suitable pictures, and this feature adds greatly to the informative character of the book. It should be clearly understood that this is not a comprehensive textbook. Rather, it is a complete exposition of the methods used by Dr. Swenson and his associates in the construction of full dentures. Few alternative procedures are described. For this reason, the volume can be recommended principally to those interested in an account of the methods used by Dr. Swenson. However, so much material of fundamental interest and importance is included herein that the volume should have a general appeal. There is an adequate bibliography and index at the end of the book. It is nicely bound. The illustrations are of adequate size and in general of good quality. The paper is of good stock, and the type clearly legible.

Dentistry: A Digest of Practice

J. B. LIPPINCOTT COMPANY, Philadelphia, Pa.

This dental digest magazine represents a new departure in dental journalism and one that promises to meet an apparent need in the field of dental literature. For several years, desires have been expressed for an abstract form of dental literature affording the average reader all the latest ideas in a condensed style that could be read quickly. The first number of *Dentistry* serves as an example of the latest effort to meet the need and it serves the purpose very well indeed.

All phases of dentistry are included in the content and many journals are represented. The articles are brief and condensed, but the style does not appear to sacrifice understanding to brevity. The large majority of general articles on dental subjects lend themselves fairly well to this style, but it is difficult to conceive of a satisfactory digest of a scientific article. On this premise, it is assumed that *Dentistry* will confine itself to the presentation of more or less general articles on dentistry. For the latter type, it is evident that reading of and familiarity with the articles which comprise most of the literature will be greatly facilitated by *Dentistry*.

To one whose reading time is limited, but who wishes to keep abreast of the periodical literature, this new magazine will serve as an admirable aid.

A subject index supplemented by a contents index facilitates the use of the magazine appreciably. While the subscription price of

the magazine, $4.50, may tend to restrict its popularity, the personnel of the editorial board, under the directorship of J. L. T. Appleton, of the University of Pennsylvania Dental School, guarantees an effort that is worthy of the support of the profession.

Dietetics Simplified

By L. JEAN BOGERT, Ph.D., formerly Instructor in Medicine, University of Chicago; Instructor in Experimental Medicine, Yale University; Research Chemist, Obstetrical Department, Henry Ford Hospital; Etc.; and Mame T. Porter, M.A., Nutritionist, State Department of Social Welfare, Albany, N. Y.; formerly Dietitian, Hospital of the University of Pennsylvania, Philadelphia; Etc. Second edition. Cloth. 742 pages. Illustrated. Price $3.00. The Macmillan Company, New York, 1940.

THIS is a comprehensive textbook on the science of nutrition and its application to the human dietary. The first portion of the book deals with the fundamental factors of nutrition, the food requirements, vitamins, etc. The second part of the volume discusses the arrangement of menus and diet planning in normal conditions. Feeding in pregnancy and lactation and infant and child feeding are fully considered here. The final portion of the book is devoted to special conditions. Diets in diabetes, nephritis, arthritis and other conditions are considered. Following each chapter is a series of questions pertaining to the material covered. This book can be used as either a text or a reference work by those interested in this field.

Food, Nutrition and Health

By E. V. MCCOLLUM, Ph.D., Sc.D., Professor of Biochemistry, School of Hygiene and Public Health, Johns Hopkins University; and J. Ernestine Becker, M. A., Associate in Biochemistry, School of Hygiene and Public Health, Johns Hopkins University. Cloth. Fifth edition. 127 pages. Price $1.50. Published by E. V. McCollum and J. Ernestine Becker, Baltimore, 1940.

THIS short non-technical book contains the best information available in the science of nutrition, particularly prepared for the layman. There is a brief but adequate discussion of the minerals, vitamins and other food factors about which the laity are constantly hearing and are reading in popular literature. The volume strives to give a sufficient background for an understanding as to what is going on in the field of nutrition and how it applies to human problems. This volume can be recommended without hesitation to persons interested in this subject.

Dental Caries

Findings and Conclusions on Its Causes and Control. 188 pages—cloth binding.

Have you a copy of this excellent compilation in your library? If not, we suggest that you order one at once as only a few copies remain.

Its 188 pages contain 195 summaries on the causes and control of dental caries by observers and investigators in twenty-five countries. The findings and conclusions are presented in a condensed and digested form and represent practically all of the published results of research on this subject up to the present time.

The Advisory Committee on Research in Dental Caries is to be congratulated on the compilation of this exhaustive study and every practicing dentist should be thoroughly familiar with its contents. Order from the American Dental Association, 212 E. Superior St., Chicago, $1.00 per copy.

ASSOCIATION ACTIVITIES

Contents

PRESIDENT'S PAGE
Holiday Greetings 1967

COMMITTEE ON DENTAL PREPAREDNESS
Résumé of Activities 1970
Dentistry in Mobilization
Brigadier General Leigh C. Fairbank 1972
Mobilization of the Dental Profession (Questions and Answers) 1975

BUREAU OF PUBLIC RELATIONS
A Committee on Public Health and Education 1977
How Dentistry Contacts the Public in Kansas
Fred A. Richmond, D.D.S. 1978
Aiding Your Child to Face the World
J. A. Salzmann, D.D.S. 1983
Santa Claus Models 1985
A.D.A. 1941 Appointment Book 2000

COUNCIL ON DENTAL THERAPEUTICS
Vitamin K 1986
Federal Trade Commission Stipulation on Fleer's Dubble Bubble Gum 1988
Federal Trade Commission Stipulation on Vitamins Plus 1989
Accepted Dental Remedies 1989

COMMITTEE ON LEGISLATION
Court Upholds Validity of Restriction on Advertising Credit and Terms of Credit 1990
Lack of Evidence in Suit to Revoke License 1990
Oral Surgery Complications from a Medico-Legal Standpoint
L. M. Ford, L.L.B., J.D. 1992

NEWS ITEMS
G. Walter Dittmar To Be Honored 2000
Congress on Dental Education and Licensure 1991

OBITUARIES
Charles D. Cole 2001
Percy Roy Ashplant 2002
DeForest Davis 2003
Deaths 2004

CORRESPONDENCE
"Studies on the Local Factors in Dental Caries"
Chicago Dental Research Club 2005
"Has It Been Proved That Sugar Is a Significant Factor in Dental Caries?"
Louis M. Fleisch, D.D.S. 2006

President's Page

HOLIDAY GREETINGS

To the Members of the American Dental Association:

HERE in the United States, a year of unprecedented historical importance will come to a close this month, with the customary holiday spirit that shines with the brilliance of a solitary beacon over a troubled world. As we contemplate the warmth and pleasure which will accompany our Christmas festivities, we are conscious of duties and obligations imposed upon us as citizens and as members of the American Dental Association.

The foremost of these is our participation in the program of dental preparedness, to which our attention has been called through questionnaires sent to each registered dentist in the United States. Information gained through the responses from the questionnaire serves as a basis on which military and naval authorities will be able to judge the dentist's specific capabilities. In this crisis of conscription, these answers will allow the dentist preferred classification, placing him in the category that his training and experience best qualify him to enter.

To date, of more than 72,000 questionnaires mailed to the dentists of our country, 38,000 have been answered and returned to the Central Office of the American Dental Association. To fully cooperate with our government and to facilitate the excellent work of the Dental Preparedness Committee, each member, irrespective of age or health, still retaining his questionnaire, is urged to furnish all information requested therein and to return it as soon as possible to the Chicago office. Data contained in the questionnaires will also be of assistance in the compilation of a comprehensive dental directory, the first volume of its kind to be published since 1928, and a work that is much needed by our profession.

A second consideration of particular appropriateness at this time of the year is that of the Relief Fund Seals. The Yuletide fires that brighten our hearths will send their glow into less fortunate homes through the purchase of these seals. Since 1925, and after years of pioneer effort, the Relief Fund of the American Dental Association has answered the cry of human want and brightened the dull, cheer-

less hearts of our needy fellow members and their families. Let us, for the moment, cheerfully put aside plans of our own and, through the purchase of these seals, make brighter the hours of our less fortunate brothers.

It may well occur to us that the spirit of giving imparted in the First Sermon has long been neglected in many lands, and that there are helpless villages and cities far beyond our reach whose one main concern is not the tinsel on a Christmas tree, but the constant threat against life itself, the uprooting of peace and the destruction of faith. It may be well for us also to remember that within our own borders, while the serene winter snows cover the roadways and a peaceful sun adds its brightness to Christmas Day, there are those in our midst whose hearts are deprived of the Christmas joys and who, with worried minds, contemplate a dark uncertain future.

It is with the money obtained from the purchase of the seals which you have received that voices may again be lifted in hope. What a gratifying feeling it is to those of us who may be more fortunate to know that our ill, disabled professional brothers, and the widows and children of our unfortunate colleagues, are thus enabled to enter the New Year with a lightness of step that tells of a renewed faith in mankind. To this service of the Relief Fund, we cannot help giving our wholehearted aid. We may be assured that in assisting this worthy cause by our contributions, we are doing our share toward making the First Sermon a reality.

In addition to these close problems of daily living, December also turns our attention to the coming business activities within our own organization. In keeping with the manifold program now being carried on by the American Dental Association, membership dues, beginning with the first of January, will be increased from $4 to $6 annually. Current funds have been drawn upon heavily for financing numerous activities. The extended program of the Educational Council, the necessity for maintaing the National Dental Health Program Committee's work in behalf of both the public and the dentists, the call for our organization's participation in the National Preparedness Program through the activities of the Association's Preparedness Committee, all bespeak the necessity of this raise in dues.

Other activities and plans include projected work by the Research Commission and the Council on Dental Therapeutics. The necessary increase in personnel in the Chicago office and the extension of its various departments and the promotion of work undertaken by our numerous bureaus and committees cannot be adequately supported without the additional funds.

When we pause to consider the benefits each of us derives from

our membership in the American Dental Association, we can readily see the need for this change in dues. Not only are we offered an opportunity for study and research through the pages of the JOURNAL, but also membership entitles each dentist to the excellent service of the Library Bureau, to the Dental Index, to the findings of the Bureau of Chemistry, to the protection extended by the Legislative Committee and the insurance program and also the services of innumerable other departments of the Association; combined efforts of which prove the value of membership in the American Dental Association.

The service of the American Dental Association to the individual member grows more and more coherent and effective as the days go by. Each one of us is aware of his dependence on the organization for knowledge, advice, guidance and protection. We also recognize that its place in society is the result of our individual efforts combined in one great partnership. Toward this end, we can regard the increase in dues as a necessary and worth-while investment. Similarly, an increase in membership would add to the joint benefits derived from the Association, supplying new zeal and new energy to our various departments and fields of research. Therefore, this coming year, let us all work for a substantial increase in our membership. In moving ahead full swing and working for this increase, we will be playing an important part in the progress of our organization.

In closing, it is my hope that, in the future, the activities of the American Dental Association will be constantly before us. Next month, it is my intention to present in these pages the first of a series of reports on the work of our committees. With a better understanding of what these men are doing for us and the results of their efforts, we can better appreciate the privileges of membership in the American Dental Association, and we shall take pride in its immeasurable contribution to public health.

Wilfred H. Robinson.

COMMITTEE ON DENTAL PREPAREDNESS
RÉSUMÉ OF ACTIVITIES

THROUGHOUT the rapidly changing program of National Defense, the Committee on Dental Preparedness has attempted to keep abreast of the changes. With such a tremendous program as is being carried on by the Government, there are many things happening that will have their effect upon the dental profession.

To bring some of these problems before the Preparedness Committee, the chairman, C. Willard Camalier, called a meeting October 31. The entire group met in Washington and, in addition, the meeting was attended by Oren A. Oliver, representing the President of the American Dental Association, Wilfred H. Robinson; Leroy M. S. Miner, representing the American Association of Dental Schools; Brigadier General Leigh C. Fairbank, representing the U. S. Army Dental Corps, and W. J. Pelton, representing the United States Public Health Service. Also, during the meeting, the committee was visited by George Clark Dunham, secretary of the Committee on Health and Medical Preparedness, and Col. Charles Booth Spruit, medical advisor to Selective Service National Headquarters.

At this meeting, several matters of importance were considered. First, the progress of the questionnaire on dental preparedness, which was mailed to every dentist in the United States, was discussed, and the committee went on record as urging the immediate cooperation of all dentists in this program.

To date, there have been approximately 40,000 questionnaires returned to the Central Office. This represents but a 56 per cent return. This percentage of return is too low to be of value statistically. It is realized that for the desired results, the committee must have the complete cooperation of the profession, and an appeal is made herewith for that cooperation.

In order that all may have an understanding of the program that was outlined at Cleveland, a review of the situation may be in order. In July 1940, the American Dental Association received a request from Government officers for assistance in the solution of the problem of mobilization of the dental resources of the Nation. This, in view of the things that might lie ahead, was a request that could not be ignored. To cooperate in this program meant the expenditure of much money and, in the consideration of this part of the problem, the Board of Trustees decided to make the same expenditure of funds serve a very evident need in the profession today, that of a complete dental directory of the United States. The Committee on Dental Preparedness formulated a program and submitted it to the House of Delegates, and, on the basis of the presentation, the House voted $25,000 for this purpose. This sum was divided into two parts: $5,000 for the expenses of the committee during the fiscal year, and $20,000 for the purpose of distributing the questionnaire and tabulating the returns. This tabulation is to be made by means of tabulating machines, which will not only insure accuracy, but will also mean a saving because of the speed of tabulation possible. On the face of it, this seems to be a large expenditure of money, but when the problem is considered from the national viewpoint, the amount is not excessive.

Many men have not understood why they did not receive a questionnaire in the original mailing. It must be realized that in any project including the dentists in the United States, the membership list of the Association could not be used, because it includes only approximately one third of the dentists in the country. To solve this problem, it was decided to

use a commercial mailing list, and hence it is possible that a dentist may have been a member of the American Dental Association for a number of years and yet his name may not be on the list that was used. To prevent the exclusion of any dentist, the committee has requested the cooperation of all dentists who did not receive a questionnaire to the extent of asking them to so inform the Central Office at 212 E. Superior St., Chicago, Ill., whereupon a questionnaire will be mailed to them at once.

From the percentage of returns to date and from some of the comments that have been received, many men are not answering their questionnaires completely because they are beyond the age of 55. Their failure to do so defeats the purpose of the survey as far as the proposed directory is concerned, and it is urged that all dentists complete and return the blank regardless of their age.

Several requests that large numbers of questionnaires be mailed to various points for distribution have been received, but the committee decided that this would not be advisable, because an accurate record of all questionnaires issued would be rendered impossible and the printing costs would be greatly increased if hundreds of questionnaires that might not be used were distributed throughout the country.

Many other matters were considered by the committee, among them being the personnel of the state military affairs committees. It was suggested to these committees that they enlarge their personnel in accordance with the necessity in their own states. Many states with large metropolitan centers can best be served by local committees. These local committees are, of course, expected to function through the state committees. This matter of expansion is left entirely to the discretion of the state committee, the only objective being a more nearly complete service.

The question of protection of the practices of dentists who are called for military service was quite thoroughly considered. Some plans are already in operation throughout the country, and it is the hope of the Preparedness Committee that assistance may be given in the problem. Leuman M. Waugh, J. Ben Robinson and E. H. Bruening were appointed as a subcommittee to consider the problem and the results of their deliberations will be made known as promptly as possible.

It was reported that the Manual of Military Dentistry will be ready for distribution in the near future. This manual will serve as an outline for study in the many clubs now being organized for study purposes. It was urged that state and local societies create study clubs for this purpose.

One phase of the study that is causing some concern is the status of the dental student at the close of the present school year. There is pending in Congress at this time legislation to provide for future deferment of dental students and also for the protection of dental draftees. The committee endorsed this legislation and, in addition, appointed a subcommittee to pursue the matter further. J. T. O'Rourke and J. Ben Robinson were named as this subcommittee.

Elsewhere in this issue of THE JOURNAL will be found an article on the preparedness program by Brigadier General Fairbank. This article, together with the questions and answers which accompany it, will explain the status of the program in the Army today; and in it will be found the answers to many questions in the minds of many men. A careful reading of this article is advised.

The Dental Preparedness Committee is making every effort to keep the profession informed as to the progress of the program. Your cooperation will be appreciated.

Committee on Dental Preparedeness
C. WILLARD CAMALIER, *Chairman*
GERALD D. TIMMONS, *Secretary*

DENTISTRY IN MOBILIZATION

By BRIGADIER GENERAL LEIGH C. FAIRBANK,* Washington, D. C.

[The following statement from the head of the Army Dental Corps indicates clearly the status of all dentists in the present Mobilization Plan.—Editor.]

DENTISTRY faces a great responsibility today. In characteristic fashion, the profession has responded to the call for the mobilization of our dental resources. There have been more than 10,000 inquiries from the dentists of the nation relative to military service. Many questions have been asked—all of them indicating a profound interest; most of them, a splendid patriotic spirit, and some, a gross misunderstanding of the purpose of our mobilization.

Democracy has gone into action, action for national defense and *not* war! If democracy stands for anything in the Western Hemisphere, it should mean that all citizens must defend our nation and its institutions. Mobilization calls for national sacrifice and genuine patriotism. Citizenship demands the abandonment of selfish interests if democracy is to survive in the world. The manifest spirit of the American Dental Association, at the recent meeting in Cleveland, and the thousands of personal letters received in the Surgeon General's Office, indicate the determination of dentistry to meet the call for service.

Dentistry's interest is concerned with just what mobilization will demand. For more than twenty years, a large dental reserve has been a part of our military medical service. Obviously, dentists commissioned in the Reserve Corps will be called to active military service. This is the purpose of the Reserve Corps. However, at the present time, it is the plan of the government to call only the captains and lieutenants of the Dental Reserve Corps to active duty. All dentists holding commissions in these grades can expect orders for one year of active duty at some time during mobilization.

Dentists of military age (21 to 35 years) are subject to induction under the provisions of the Compulsory Selective Service Act, each case to be determined on its own merits. In the operation of this law, the reserve dental officer will not be drafted for military service, but will be ordered to duty as needed. Those without reserve commissions will be subject to induction in accordance with the disposition made by the local draft boards; which means that the drafted professional man will enter as a private soldier.

It is perfectly obvious that the Government has no intention of creating a shortage of physicians and dentists or of interrupting hospital, clinic and school activities essential to the public welfare. National health is a tremendous factor in mobilization for national defense. Group exemptions or deferments of physicians will not be approved, but the professions can expect satisfactory adjustments in regard to these several important points at an early date. Provisions have already been made to secure reserve commissions, under certain conditions, for physicians and dentists who may be drafted.

Physicians and dentists who have been notified by their draft boards that they will be called may make application for a reserve commission. They should complete all the necessary forms for a reserve commission, securing these forms from their Corps Area Headquarters. Recommendations from reputable citizens, preferably physicians or dentists, must accompany the application. There must, in addition, be a certified statement from the local draft board confirming

*Chief, Army Dental Corps.

the call for induction, or to the effect that the applicant has drawn a low number. This provision has not for its purpose the evasion of military service, but is to provide a professional status for the physician or dentist during his period of military training.

The application will be considered by a board of officers and, if the candidate is found qualified, he will be commissioned a first lieutenant in either the medical corps or the dental corps and immediately ordered to active duty for one year. It should be clearly understood that the qualifications of each candidate will be thoroughly investigated. Only those meeting the present requirements as to physical standards and professional accomplishments will be commissioned. The very best dental service will be demanded for our soldiers. Every dentist in our nation should approve this declaration.

Following are the requisites:

1. The applicant must have a degree of doctor of dental medicine or doctor of dental surgery from a recognized school of dentistry.

2. The applicant must have a license to practice in a state, a territory or the District of Columbia.

3. The applicant must be actually engaged in the ethical practice of dentistry.

4. For an original appointment, the applicant must not be more than 35 years of age on the date of appointment.

5. The applicant must be physically qualified in accordance with provisions of Army Regulations 40-105.

Selections of the men will be made for reserve commissions and immediate active duty, not as a group, but entirely upon the basis of individual merit.

Except as above mentioned, appointments in the Dental Reserve Corps have been suspended for the present.

DENTISTS OVER 35 YEARS OF AGE

Many dentists over 35, the maximum age for appointment in the Dental Reserve Corps, have made application for reserve commissions and active duty. Under existing regulations, this is impossible, as no exceptions have been made for units of the Medical Department contemplating active duty under the present mobilization plans.

INTERNS

Necessary provisions are being developed to defer military service for those dental interns pursuing recognized high standard internships, each case to be decided on its individual merits. Training in dental clinics of the Army is far superior to the so-called dental internships in many hospitals today.

DENTAL SERVICE IN THE ARMY

Dental clinics are now under construction in all the camps in which the Army will mobilize. These clinics are large. They will be supervised by senior dental officers of the Regular Army and will be administered by selected officers of years of military experience. The professional service rendered to military personnel will include the necessary restorative fillings, required oral surgery and replacements authorized under the provisions of Army Regulations. Each clinic will have a chief clinician, oral surgeon and prosthetist to head the three major sections of the clinic. These dental officers will have special training at general hospitals prior to their assignments to camp clinics and hospitals.

All dental officers in training will be required to undergo a few months of training with the field medical units. This training will be devoted to special duties as Medical Department officers, and as auxiliary medical officers, and in the particular field dental service as rendered in time of war. Dental Reserve Corps officers who possess special qualifications, such as oral surgeons and prosthetists, will be assigned to special duty at one of the many larger hospital units whenever possible. Dental officers possessing special

qualifications have already been assigned to special duty in connection with the selection, purchase, storage and issuance of the thousands of items that are to be distributed to the many clinics and training centers for use in the dental service. New instruments and equipment have been developed and dental manufacturers are producing these items on schedules which assure availability in ample time to meet the needs of the Dental Corps during the early months of 1941.

The nation is certain to require thousands of dentists annually for military service in this mobilization program. The Government has shown a desire to secure these dentists without demanding great personal sacrifice, without depleting dental service in any community and without interfering with dental education. The mobilization of dentistry for national defense could very easily upset the entire dental structure.

The American Dental Association has given serious thought to these many important problems in the national defense program. In no other period in all the history of organized dentistry has there been such excellent cooperation between the dental agencies in Government and the American Dental Association. This has been because of our responsibilities as citizens and the great desire to secure every consideration for the dentists of our country, in keeping with the best interests of the nation, the profession and the individual dentist. The Association has provided opportunity for service. It has assisted the Government in many important ways and has represented dentistry in Congress and before important committees. It has protected those who have personal responsibilities and civil commitments; it has provided plans for adequate dental care for the public, and it has made a major effort to assure the maintenance of dental schools and the dental staffs of hospitals. The activities of the American Dental Association in time of mobilization are of tremendous importance and but few of our members appreciate the endeavors of the Association in behalf of every dentist of the country.

During the next five years, a lively interest in military dentistry is sure to be created among a majority of dentists in every state. In the first place, the dental officer is a Medical Department officer. Some have never understood just what this means. For one, I believe dentistry is a part of medicine in many respects; a branch, just as much as that of the throat specialist or any other specialist who treats some part of the body to restore normal function. We talk of dentistry as an essential health service. It is imperative that we make it so. Being in the Medical Department of the Army, we are afforded an excellent opportunity to develop this trend. In organization, training and service, dental officers are first essentially Medical Department officers. There are many responsibilities that we must share with medical officers in the camps and hospitals, and on the battle fields. We not only *can* perform this function but we *must*, if we desire our profession to realize its place in the field of medicine.

Democracy in action should be the universal expression of our people as the nation mobilizes for national defense. It should be the expression of our citizens, in which we accept our duty with that spirit which exemplifies the noble traits of a free people. It must be the manifest expression of the dental profession, if we are to be worthy of our heritage. Not only those in the military services, but also those who remain at home have duties and responsibilities in the National Defense Program. Many who are too old for military service, physically disqualified or unable to serve actively in the Army for other reasons, have expressed a desire to serve in some other capacity. Many are serving on medical advisory boards and induction boards,

representing dentistry in a commendable manner. But, for the entire profession, there are obligations to the nation, the public and those who are called to military service.

While I was in California a few weeks ago, the question arose: How about the dentists who are called to military service—what becomes of their practices? This is a serious problem. Upon entering the service, the professional man takes his stock in trade—his education, experience, and skill—with him. The doctor locks up his office, leaves his established practice and fulfils his obligation as a citizen. Upon his return, his practice is gone! Others are in a similar dilemma, but our profession has a serious problem in this regard which we should solve. It is an opportunity for us to prove just how much organized dentistry can mean to our membership. Southern California has developed an excellent plan and one that is receiving the general approval of dental societies throughout the country. This plan is known as the "Patient Escrow Plan for the Military Duration." The Dental Preparedness Committee of the A.D.A. is also developing a plan. Back of this effort is evidence of a fine professional spirit and a desire to protect the interests of those called to military service.

Dentistry faces many trying problems in connection with national defense and the mobilization plans which are to continue for the next five years. Every dentist in the nation will be affected directly or indirectly. Let us determine that we will do that which every good American citizen should do—that which every good American dentist should do. Let us determine to meet every problem intelligently, faithfully and honestly. Let us endeavor to accomplish the tasks confronting our profession in a manner to prove the value of American dentistry to our nation in time of national need. To those who don the uniform and enter the service for active duty: Assume your responsibilities as a great obligation to your country, your profession and yourself. While we are laboring for the defense of our nation, we can also build for our profession—the profession we love!

MOBILIZATION OF THE DENTAL PROFESSION

QUESTIONS AND ANSWERS

Question. *What is the purpose of the questionnaire sent out by the A.D.A.?*

Answer. To secure a record by states of dentists of military age who would volunteer for service under the present mobilization and training plans and those who would volunteer for service in time of war, and to secure material for the dental directory.

Q. *What is the status of the orthodontist in the present mobilization plans?*

A. The orthodontist will not do orthodontic work. Out of fairness to him and his patients, he will not do restorative work. Assignment as chief clinician in a clinic would be desirable.

Q. *What are the possibilities of serving more than one year?*

A. Reserve dental officers whose record during the first year is highly satisfactory may make application for an additional year of extended active duty. If it is approved, consideration will be given to the request.

Q. *Can a reserve officer remain on active duty for five years during mobilization?*

A. No. The whole purpose of the train-

ing program is to secure dentists for training so that we shall have at least 10,000 trained military dentists at the end of the five years.

Q. *What chance has the reserve officer on extended active duty to secure a commission in the Dental Corps of the Regular Army?*

A. None. There are no vacancies in the Dental Corps of the Regular Army.

Q. *May I make an application for a reserve commission?*

A. Applications for reserve commissions will be returned. Appointments have been suspended except for dentists who are about to be drafted. If you have received notice of pending induction from your induction board, you may submit your application to the headquarters of your Corps Area. Your induction board will advise you of the address.

Q. *I am 37 years old and wish to join the Army. What shall I do?*

A. No one who is over 35 years of age is commissioned in the Reserve Corps at present. In time of war, these limitations are suspended and applications are considered from the older men, on the basis of reputation and experience and the needs of the service.

Q. *If I am drafted, what chance is there of getting a commission?*

A. Immediately upon receiving notice from your board, you should secure a certification of your number and your pending induction. Submit this with your application for a reserve commission to the headquarters of your Corps Area. Favorable action by headquarters will result in your receiving a commission as a first lieutenant in the Dental Reserve Corps.

Q. *If a dentist is inducted into the Army as a private and then gets a commission, what will he be promoted to?*

A. A dentist inducted into the Army as a private should make application for a reserve commission. He will then appear before a board of officers. If the board recommends approval, he will be commissioned and promoted to the grade of first lieutenant.

Q. *How about promotion for the reserve officer while on active duty?*

A. No definite policy has been established for promotion of the reserve on active duty.

Q. *What is the status of medical and dental students in the draft?*

A. All medical and dental students are deferred for military duty under the provisions of the Selective Service Law, until June 30, 1941. After that date, bona fide students regularly enrolled in medical and dental schools should report to their draft boards, reporting their change of status and requesting further deferment permitting them to complete their undergraduate courses for the following year. The Surgeon General is making every effort to solve the problem of deferment of medical, dental and veterinary students by recommending suitable regulations for the Selective Service.

Q. *What is the status of dental hygienists?*

A. The American Red Cross is enrolling dental hygienists for the Army. Inquiries should be addressed to National Headquarters, American Red Cross, Washington, D. C.

Q. *Does the Army need representative men in the procurement of supplies and equipment?*

A. Personnel required for this activity

have been secured and will be called to duty as needed. No vacancies exist for more appointments.

Q. *What about dental mechanics?*

A. They have been afforded an opportunity to enroll with the American Red Cross. If their names appear on this roll, which is turned over to the War Department, they will be assigned to the dental service, if drafted. Inquiries should be addressed to National Headquarters, American Red Cross, Washington, D. C.

BUREAU OF PUBLIC RELATIONS

A COMMITTEE ON PUBLIC HEALTH AND EDUCATION

AT the Cleveland meeting, the House of Delegates, on recommendation of the Dental Health Education Committee and the Public Health Committee, created a new committee combining these two committees, with the title Committee on Public Health and Education.

The House of Delegates provided for the necessary change in the Constitution accordingly and approved appointment of the following as the committee: Frank C. Cady, chairman, U. S. Public Health Service, Washington, D. C.; Hugo M. Kulstad, Hollywood, Calif.; Emory W. Morris, Battle Creek, Mich.; J. G. Williams, Atlanta, Ga.; Leon R. Kramer, Topeka, Kan.; Howard C. Miller, Chicago, Ill., and Leo J. Schoeny, New Orleans, La., with Lon W. Morrey, Supervisor of the Bureau of Public Relations, Chicago, Ill., ex-officio member and secretary.

Following is the resolution providing for the committee and specifying its duties:

The Committee on Public Health and Education shall consist of seven members, not more than three of whom shall be full-time public health dentists, and the Supervisor of the Bureau of Public Relations, who shall be an ex-officio member and shall serve as secretary. All members shall be elected by the House of Delegates upon nomination by the Board of Trustees.

One member shall be elected for a term of one year, two members for a term of two years, two members for a term of three years and two members for a term of four years. Thereafter, as terms expire, members shall be elected for a term of four years. The committee shall elect a chairman and adopt such regulations for the government of its actions as it may deem expedient.

The office of the committee shall be at the headquarters of the Association. The committee shall hold such sessions at the Annual Meeting and during the year as it deems necessary. Four members shall constitute a quorum.

The duties of the committee shall be:

1. To promote the public health.
2. To disseminate dental health information.
3. To act as consultants to the Committee on Legislation in all matters of legislation pertaining to public health.
4. To supervise the activities of the Bureau of Public Relations and to make recommendations concerning the work of this Bureau to the Board of Trustees.
5. To appoint subcommittees to assist it in carrying on its duties and to make an annual report of its work to the House of Delegates.
6. To expend money or contract financial obligations only as it shall be authorized to do so by the action of the Board of Trustees and with the approval of the House of Delegates.

HOW DENTISTRY CONTACTS THE PUBLIC IN KANSAS

By FRED A. RICHMOND,* D.D.S., Kansas City, Kan.

OUR creed of dental health education and its application in Kansas is as follows:

First: We believe the American Dental Association to be the authority in matters pertaining to dental health, the source of policies relative to dentistry in public health and the mouthpiece of the dental profession relative to factual education in this country.

Second: We believe the Kansas State Dental Association, a component of the American Dental Association, to be the interpreter of the policies of the American Dental Association relative to their application in Kansas. We believe we should actively and morally support their administration in the State of Kansas.

Third: We believe the Kansas State Board of Health, the official health agency of the state, to be the creator and administrator of devices designed for the practical application of approved policies and factual material in the preventive phases of dentistry for the solution of the health problem in the State of Kansas.

This creed, or philosophy, sums up in a few words the conclusion arising from the experience of the dental profession in Kansas after more than twenty years' use of trial and error methods in our dental health education programs.

It is true that in May 1936, when the Division of Dental Hygiene was first established in the Kansas State Board of Health, these beliefs could not be so clearly assembled in three short paragraphs. From the maze of experience of hundreds of dentists over a period of twenty years in making dental inspections and otherwise promoting dental health, these conclusions have been drawn.

To one man, the director of the Division of Dental Hygiene, was delegated the task of teaching all phases of preventive dentistry to approximately 2,000,000 persons. He was also expected to administer policies relative to clinical services, research and special studies. As in most new divisions, the budget was limited to a few hundred dollars.

This picture presented a problem of considerable magnitude. It required the services of an experienced administrator and one specially trained in the field of public health. Accordingly, our director attended a short course in public health for health officers on the activities of all divisions of a state board of health and the elements of administration. What we lacked in money was offset to a great extent by the enthusiasm and ability of Leon R. Kramer, our director. Dr. Kramer had earned an enviable reputation by consistently preaching the gospel of preventive dentistry during his many years as a practicing dentist in Kansas.

A committee on school inspection and oral hygiene has been appointed by the Kansas State Dental Association to act in an advisory capacity. On the return of our director, this committee, together with the officers of the state dental association, through the various district dental society presidents, appointed 104 county chairmen. In the large cities, the dental societies appointed their own chairmen.

*Secretary, Kansas State Dental Association.

Read at the Annual Conference of State Societies with the American Dental Association, Chicago, Ill., February 11, 1940.

We understood the great need for an educational program, but since the funds of the division of dental hygiene were limited, we sought help from persons who did not require extra pay for their services. This class of persons included teachers, public health and school nurses, health officers, the personnel of county, city and state health organizations and others, numbering in all approximately 30,000.

Officers of the state teachers association were then interviewed relative to educational procedures. One professor was asked what he thought about the dentist teaching the children dental care in the school room. He answered by asking if the teacher would be expected to make the dental examination. Upon receiving a negative reply, he said, "Then it would be much better to let the teacher teach and the dentist confine his efforts to dental inspections." Following their advice, all pamphlets available were collected and a committee of teachers was appointed to evaluate them and select the ones they could use to the best advantage. We also provided for kindergarten and the primary grades tracing sheets and charts for coloring. We were pleased to see that all the material secured from the Bureau of Public Relations of the American Dental Association was selected, and only in cases where there were no American Dental Association pamphlets for certain age groups did they select pamphlets not bearing the authorization of the Association for their sources of health information.

This experience impressed upon our minds the fact that teachers need and desire authoritative and well-illustrated factual material. They want material that can be procured year after year, and which is not subject to the whims of an advertising manager of some commercial concern. They want dental facts, translated according to pedagogic procedures and combined with well-illustrated teaching texts. They want material that bears the highest stamp of authority.

The next question that the teachers presented was: "What facts shall we stress to the early age groups, the older children and those in high school?" Last year, the director of the dental division, with the aid of an authority on teaching, developed a teaching outline for the text that was selected by the teachers to meet this requirement. The state superintendent of instruction has now incorporated this outline in his teaching methods, and has made "Dental Care" one of the sixteen health units required to be taught in the schools under his jurisdiction. More than 50,000 pamphlets and outlines have been supplied to teachers in Kansas. The eight-leaf ensemble chart and colorful posters are constantly in demand.

In prenatal, preschool and school projects, the nurse plays an extremely important rôle. The nurse, like others, prefers to use materials that are colorful and interesting and devices that are easy to handle. In many instances, nurses have changed from an apathetic frame of mind to one of lively interest upon seeing the fine type of educational material produced by the Bureau of Public Relations of the American Dental Association. Continued efforts made by the Bureau to produce the finest possible educational material will do much to stimulate and perpetuate the interest of the nurse and the teacher. The nurses in Kansas are instructed separately and collectively in the prenatal, preschool and school phases of preventive dentistry. The teacher is aided in her classroom programs, and dental education is included in the general health program. We, in turn, supply the nurses with data covering every phase of dental care.

We supply gratis to county units and county health officers all types of educational material, including films and slides.

Motion pictures are used extensively

in the Kansas educational program. The dental division of the state board of health has supplied the Visual Educational Department of the University of Kansas with six films on dentistry. These dental films are included in the regular circuits supplying schools all over the state with dental education via this route. Last year, these films were shown to more than 60,000 school children. It is evident that at least one new film should be produced each year by the American Dental Association or by others in conjunction with the Association.

Our films are also made available to lay groups and other organizations in the state. A fee of 50 cents is collected for the use of the film. The dental division of the state board of health also has a library of films that are loaned to professional groups without charge. These films are in constant use.

Like old stock in a store, old materials and film that have served well in their day, but do not meet the present-day requirements, should be discarded and replaced with the best material obtainable. We believe that the American Dental Association should draw up a standard of factual material and carefully define an educational policy on which producers of dental motion pictures may base their activities.

The friendly relationship existing between the state and district medical and dental associations in Kansas is evidenced by their joint activities in promoting such major activities as the "Hall of Health" in Wichita, the exchange of material in journals, the appearance of physicians on dental programs, and vice versa, and the interchange of exhibit materials for state meetings. We use American Dental Association exhibits for these purposes and we are pleased to say that these exhibits now compare very favorably with exhibits of the American Medical Association and other scientific organizations.

We supply exhibits for the state meetings of the teaching, nursing and pharmaceutic groups, in addition to the state and county fairs, throughout the state. We see the need for at least one new exhibit to be produced by the American Dental Association each year to meet this demand.

During the last year, we have been experimenting with the news releases prepared by the Association. In a canvass of readers, we found that reading interest was increased almost 100 per cent by reducing the articles to approximately 175 words. These articles, which are printed in the official state paper, may be clipped for use in local papers by the various district dental societies. The state dental association, and the dental division of the state board of health, together with the Kansas state medical, pharmaceutic and hospital associations, recently sponsored a Sunday health supplement in the *Topeka Daily Capitol*. This supplement comprises a complete section in the paper. An artistically prepared space 11 by 19 inches was used by the dental society to announce the institution of the news column just described. At regular intervals, the weekly release of the Kansas State Board of Health to weekly papers in the state is a dental article.

Dental topics are discussed once each month in the regular broadcasts of the state board of health. In addition, our director uses stations in various localities in the state to broadcast messages on dental health.

The director and his assistants give lectures to teachers and nurses each summer at county educational institutions. Approximately twenty counties are covered each year. These lectures do much to encourage teachers and nurses to make special efforts to cooperate with us in our dental program. Teaching materials are also shown and demonstrated at these meetings.

A reference course in "Children's Dentistry," which was presented in many localities over a two-week period early last spring, was very successful. More

than 70 per cent of the practicing dentists in the state attended.

The training for the personnel of the dental division provided for one short course for the director at Vanderbilt University for a period of three months in 1936. At the present time, he is taking a full year course leading to a master's degree in public health at Columbia University. His assistant, Miss Evelyn Hannon, a graduate nurse, with considerable public health experience as a teacher, was provided a year's course in dental hygiene. She attended the Kansas City-Western Dental College, where she was graduated, and she is now a registered dental hygienist in addition to her many other qualifications.

I wish to emphasize that all of the activities mentioned are carried out with the aid and full cooperation of the Kansas State Dental Association.

Since this paper deals with only the educational phases of the Kansas Oral Health Program, I have purposely omitted the description of other phases of the program, such as dental inspection and clinical and special activities carried on by the dental division of the state board of health and the dental society. The program as described is effective in seventy-three of the 105 counties in Kansas and involves approximately 300,000 children.

The general dental educational program for the dental division of the state board of health in conjunction with the state dental association can be summed up as follows:

1. Prepare exhibits for fairs; meetings of professional groups and others.
2. Write and/or give radio talks on general or specific problems of oral health.
3. Prepare news articles on general and specific problems of oral health.
4. Give talks at professional meetings.
5. Provide refresher courses on preventive dentistry to dentists in state.
6. Act as consultants relative to dental phases of state-wide control programs such as cancer and tuberculosis.
7. Establish a series of lectures on dental phases of health in nurses' training schools, and in all public health postgraduate courses.
8. Establish a series of lectures on dental phases of health in curricula of teachers' colleges and in summer courses for teachers.
9. Provide lectures on dental health for teachers' and nurses' institutes.
10. Provide with films, charts, pamphlets, etc., dentists and interested lay groups and health councils, for educational and promotional purposes.
11. Provide data, materials and counsel to organizations such as the Red Cross and parent-teacher organizations, for promotional purposes for dental programs.
12. Serve as consultants to authorities, relative to dental problems in public institutions.
13. Teach or encourage the teaching of preventive dentistry; methods of reporting diseases, and the responsibility of dentistry in the health of a community.
14. Supply pamphlets, charts, films and other material to teachers and nurses to carry out curricular requirements relative to the teaching unit in "Dental Care."

CONCLUSIONS

The object of this paper was not to emphasize the educational program in Kansas as being superior to that of other states, but to give the background of our experiences in building an educational program.

I have tried to demonstrate why we believe that the American Dental Association should be the source of statements, policies and factual material for teaching purposes. To illustrate: One state may say, "Visit your dentist twice a year"; another may say, "Visit your dentist every three months," and still

another, "Have your teeth examined by a dentist at least once a year." These different statements lead to confusion and destroy the educational values of the statement. We should teach the same facts in every state in the union.

In the American Dental Association are grouped the various sections and societies as authorities in every phase of dental activity. Composite decisions made by each of these groups on matters pertaining to their specialties and approved by the American Dental Association should constitute absolute authority. Uniform factual material treated with the science of teaching and the art of journalism and exhibit should be ideal educational material. This factual material is the foundation on which the whole educational program is built. It must be right. Once these facts are established, the matter of preparing texts, talks, pictures and other devices will be materially simplified.

We believe that it would be an intelligent move on the part of the American Dental Association to make available funds necessary to produce exhibits, films and educational material to meet the growing demand and the expansion necessary to accomplish this purpose.

We have tried to demonstrate that the state dental associations and the practicing dentists in each state will ultimately benefit from all educational activities. We believe that it is farsighted for the dentists of the state to lend full cooperation to the director of dental programs and that the dentists will thereby assume their proper place in matters of community health. We recommend that every dentist have American Dental Association charts, posters, pamphlets, etc., in his office for display and to give to mothers, teachers and other interested persons. A manifestation of interest and activity on the part of every dentist should increase his activities in the preventive phases of dentistry.

We have listed the various avenues of publicity and education relative to oral health that are provided by the institution of dental divisions in the official health agency of the state, the state department of health. The fact that more than half the directors of dental hygiene throughout the United States are now preparing themselves to become specialists in public health paints a bright picture for the dental profession. We are assured that the educational programs of oral health will continue to be a potent force for the good of all concerned.

For these and other reasons, we again state our belief in the authority of the American Dental Association, the interpretation of policies by the state association and the application of policies and interpretations by a representative of the dental profession in the state department of health.

Huron Building.

AIDING YOUR CHILD TO FACE THE WORLD

By J. A. SALZMANN, D.D.S., New York, N. Y.

A RECENT motion picture, "Susan and God," showed one of the characters, a girl in her 'teens, wearing a brace on her teeth. The brace had been placed there by an orthodontist, a dentist who is especially trained in the practice of regulating or, as it is commonly called, "straightening" crooked teeth. Susan, the mother of the young girl, in her scatterbrain manner, felt that it was just too awful for her daughter, whom she actually saw only at wide intervals, to be wearing braces on her teeth, and she did not hesitate to remove the braces in order to make her daughter appear more attractive at her birthday party.

While we all understand, of course, that motion pictures do not hesitate occasionally to stretch a point away from reality in order to maintain and increase the interest of the audience, we, nevertheless, feel that this incident, so glibly portrayed on the screen, presents a situation which any mother may be called on to face regardless of the constant care and affection which she bestows on her children.

In the first place, had Susan been genuinely interested in the health and appearance of her child, she would have taken her daughter to the orthodontist at an earlier age. If treatment could have been started when the child was younger, it is quite possible that the daughter could have dispensed with wearing braces, or orthodontic appliances, to give them their more correct name, by the time she reached an age when facial appearance really matters. However, appliances or braces are not usually so conspicuous as shown in this movie. As a rule, children forget that they are wearing them in a very few days after the appliances are inserted in the mouth.

It is very likely that if Susan, the mother portrayed in the motion picture, had stopped to think that her little daughter had to wear braces on her teeth owing, at least in part, to a number of things which she, as a mother had neglected to do while her child was still very young, and had she given any thought to the consequences of interfering with the treatment her daughter was receiving, she would not have been so quick to remove the appliances.

There are many things in life which parents are extremely anxious to give to their children, and not the least among these is a pleasing face with which to "face the world." Not many of us, however, have ever stopped to consider the many undesirable gifts which we parents quite unknowingly, and often unwillingly, bestow upon our children, not only when they are very young, but even before they come into this world.

When the child is born, he may have features which are inherited from his own immediate parents or grandparents, but perhaps as frequently they are inherited from more remote ancestors. In addition to inherited characteristics, the child may show the influence of many conditions present during the period of growth and development, which may permanently affect the appearance of the face in general as well as the regularity or evenness of the teeth.

We should keep in mind the fact that the apperance of the face is influenced to a greater extent than is generally known by the shape of the bones, the alinement of the teeth and the condition

Presented over Station WMCA, September 24, 1940, under the auspices of the New York Tuberculosis and Health Association.

of other structures that lie beneath the skin covering the face. In spite of the oft-repeated adage that "beauty is only skin deep," the reverse is really the case: beauty is actually more than just "skin deep."

It has been pointed out many times that none of us is in a position to choose his ancestors. It is also true that none of us is in a position to choose his own mental attributes, physical characteristics, facial appearance or, for that matter, the quality of his teeth. While this holds true in great measure also for our children, there are, nevertheless, many things which parents, especially the mother, can do to prevent certain objectionable physical characteristics, such as "crooked teeth," from developing in her child.

So-called "crooked teeth" are an important factor in facial appearance even when the mouth is closed and the face is in repose. When we speak of preventing "crooked teeth," it should be explained that the teeth themselves are seldom crooked. The irregularity is due to the abnormal method of their arrangement in the jaw bones. The growth of the bone must, therefore, be modified in order to change and correct the alinement of irregularly arranged teeth.

There are many habits which a child may develop in connection with the teeth and which tend to increase their irregularity. Among such habits are mouth-breathing, finger-sucking, lip-biting, nail-biting, etc. Many habits are caused by actual physical disturbances. Mouth-breathing in children, for example, may be due to adenoids or other conditions that interfere with normal breathing through the nose. Some dental irregularities are considered to be due to the fact that children are great imitators. Subconsciously, as well as consciously, children are wont to imitate those whom they like, and, occasionally, to mimic those whom they dislike. If the person whom the child is imitating has some dental peculiarity, such as a protrusion of the lower jaw, biting of the lower lip or distortion of the mouth, the child who imitates these characteristics is very apt to bring his lower jaw into a forward position or to develop these other facial expressions and habits.

The baby teeth, the first set of teeth, play an important rôle in the development of the face and in the arrangement of the permanent teeth that succeed them. If a baby tooth is lost before the time when it is to be replaced by a permanent tooth or, contrarily, if it is retained in the mouth beyond the time when it should have been lost, there is a disturbance in the alinement of the permanent teeth. Unfortunately, the time when baby teeth should be lost or extracted if not lost of themselves is not the same for all children. Children who show a tendency to mature early may lose the baby teeth early. On the other hand, those whose general physical development is somewhat slower will show a tardiness also in losing the baby teeth. Usually, more than one examination is required even for the dentist, who is expert in such matters, to decide when and whether baby teeth should be extracted.

When baby teeth are to be lost before their proper time, the mother should not undertake to make such decisions. If the child is allowed to go without supervision, the space may close and the succeeding permanent tooth be prevented from coming into its proper place.

The thoughtful mother then is in a position to prevent or minimize the effects of most of the conditions that tend to make her child's teeth crooked and to affect his facial appearance and mental attitude toward his family, his playmates and, later on, life in general. We look at the world through our eyes. The world looks at us through our face. If our face creates a good impression, "the ice is broken," so to speak, and a warmer, kindlier acceptance will

be accorded us by those with whom we come in contact.

In order to help her child to meet the world with the best possible face, the mother should remember that her child changes considerably during the developmental period. The child that the mother brought to school for the first time this month of September is altogether different in physical makeup from the infant which she held so affectionately in her arms as a baby. Furthermore, the young men and young women of a few years hence will be altogether different in physical makeup from the youngsters who are today experiencing the thrill of their first attendance at school.

Since the teeth, the jaws and the face undergo changes as growth continues, the child should receive periodical dental examinations by his dentist in order to prevent any harmful influences on the teeth and to take care of any dental needs such as fillings, extraction of temporary teeth which are retained in the mouth too long or the early correction of irregularities in the arrangement of the teeth. The dentist seeing the child at short, regular intervals is in a position to fill teeth before they become so bad that extraction is absolutely necessary.

Recent dental examinations of more than 10,000 boys and girls 15 to 19 years of age, pupils in the vocational schools of the City of New York, revealed that the extraction of even a single tooth without replacement may seriously affect the health and appearance of children.

In the dental service of the vocational schools, located at the Central Commercial High School, the examination of pupils has revealed conclusive evidence that when a single tooth is filled by a dentist, not only is this tooth saved, but in addition the regularity of position and appearance of all the teeth are maintained and the tendency of teeth to decay is kept at a low level. Children who have any teeth extracted tend to show more bad teeth than those who retain all their teeth, which is possible through careful dental attention.

Those responsible for the conduct of vocational education in the City of New York have cited many examples of boys and girls who were refused jobs because of dental irregularities. Early care would have eliminated this barrier to employment.

214 East Forty-Second Street.

SANTA CLAUS MODEL MAKES EXCELLENT CHRISTMAS PRESENT

WHAT are you planning to give your child patients for Christmas? The ordinary Christmas Greeting Card that will be lost in the shuffle, or something a little more personal, yet inexpensive?

Why not give them a little gayly painted plaster or stone model of Santa Claus? You can purchase a split rubber mold of this jolly old character from the A.D.A., Bureau of Public Relations, for 50c. From it, you can make dozens of 4-inch models, paint them as you please and give them to the youngsters during the holiday season. Illustrations of the Santa Claus models were published on page 1669 of the October 1940 issue of THE JOURNAL. Other characters are listed on page A-36 of the same issue. This is just a suggestion for a bit of *personal* public relations work.

COUNCIL ON DENTAL THERAPEUTICS

VITAMIN K

THE following report, prepared by a Council referee, has been adopted by the Council and authorized for publication as one in a series of articles on pharmacology and therapeutics.

HAROLD L. HANSEN, *Secretary.*

It is now generally recognized that a knowledge of nutrition, in its broad aspects, is essential to the conduct of modern dental practice. The modern requirements go beyond a mere knowledge of the proteins, fats, carbohydrates and minerals, even though this is essential. The dental profession should also be informed regarding current developments in the newer and ever-growing field of the vitamins. It is well known that a deficiency of any one of several of these accessory factors may lead to the development of pathologic states of a dental nature. Moreover, deficiencies in still other vitamins may result in conditions bearing upon dental pathology, or they may result in signs and symptoms that will be recognized by the dentist.

One of the most interesting phases of the study of the vitamins is now being developed through recent and current investigations on vitamin K. This brief report is intended to present a résumé of the current knowledge of vitamin K of interest to dentists. No definite conclusions concerning the exact position of vitamin K preparations in medical practice will be presented. These must await future developments and will undoubtedly be presented at appropriate times by the Council on Pharmacy and Chemistry of the American Medical Association. There is, at present, no evidence as to the usefulness of vitamin K preparations in dental practice. However, vitamin K deficiencies in dental patients may call for cooperation with a physician.

HISTORICAL NOTE

In the course of investigation on the sterol metabolism of chicks, the Danish investigator Dam[1] noted that chicks subsisting on certain artificial diets became anemic and had marked tendencies to subcutaneous and intramuscular hemorrhage. In a later report, Dam and Schönheyder[2] noted that the hemorrhagic condition was not relieved by the addition of vitamin C or any of the other known vitamins or essential dietary factors. They suggested that the hemorrhages and prolonged coagulation time were due to a deficiency in, or a lack of, a new fat-soluble factor, which they called vitamin K (from the Scandinavian *Koagulations-Vitamin).*

After Dam's original communication had appeared, McFarlane, Graham and Richardson[3] published a report in which the hemorrhagic condition in chicks was noted. They reported that this condition disappeared after the addition of fresh cabbage to the diet.

SOURCES OF VITAMIN K

In a review by Doisy *et al.*,[4] the sources of vitamin K are mentioned briefly. This vitamin is widely distributed in green leaves and vegetables, with an abundance in dried chestnut, spinach, cabbage and alfalfa leaves. Alfalfa is now one of the main sources of the vitamin. Almquist and Stokstad[5] found that a different antihemorrhage factor developed in rice bran, fish meal and other foods that had been stored in a moist condition. Osterberg's work,[6] as well as that of Almquist, Pentler and Mecchi,[7] showed that this antihemorrhagic factor was produced by bacterial action and that a number of bacteria are able to synthesize a substance with vitamin K activity.

ACTION OF VITAMIN K

The exact mode of action of vitamin K or, more exactly, of the factors possessing antihemorrhagic activity is not known. In 1936, Schönheyder[8] found that in chicks suffering from vitamin K deficiency, a prolonged clotting time of the blood was due to diminution in thrombin. Prior to this, Quick *et al.*[9] had noted subnormal prothrombin levels in jaundiced patients. Other investigators have since shown that laboratory animals with bile fistulae have low prothrombin levels.

In a review written for the Council on Pharmacy and Chemistry, Snell and Butt[10] stated that "several investigators have reported a number of conditions in which there exists a deficiency of prothrombin which can be corrected by administration of vitamin K." Among the conditions in which hypoprothrombinemia may occur are the following:

1. Ingestion of a diet deficient in vitamin K.
2. Inadequate intestinal absorption, which may be due to (a) poor secretion of bile salts, (b) biliary obstruction or (c) intestinal lesions or obstruction.
3. Injury to the liver.

It is also sometimes seen in new-born babies.

The clinical reports now available indicate that vitamin K has been found useful in increasing the prothrombin level in cases of obstructive jaundice and in bleeding in the new-born. It has also been employed in a number of other conditions in which the prothrombin level was found to be low. Since absorption of the vitamin from the intestinal tract is apparently promoted by the presence of bile, bile or bile salts are often administered with it.

UNITS, DOSAGE AND ADMINISTRATION

Various vitamin K units have been proposed and used. The Dam[11] unit proposed by the original investigator is illustrative of these. This unit refers to a special preparation of dried spinach to which a value of 500 units per gram was assigned. All such units will undoubtedly be superseded by more exact units based upon the developing knowledge of the actions of the pure chemical principles.

Spies *et al.*,[12] in a general article on vitamin therapy, have pointed out that very little is known concerning the maintenance requirement or optimal dosage of vitamin K.

The commonly employed route of administration of vitamin K preparations, especially with bile or bile salts, is oral. Intramuscular injections of emulsions of vitamin K have also been given. The response is less rapid than with oral administration. Intravenous administration has also been tried, but clinical experience with this mode of administration has not been extensive.

CHEMISTRY OF VITAMIN K

In the earlier work on the isolation and purification of vitamin K, it was found that the substance is insoluble in water, but is soluble in common organic solvents such as petroleum ether and acetone. The vitamin is quite stable on heating, but unstable in alkaline solutions. The potency of the vitamin is destroyed by ultraviolet light.

It is now clear that the compounds isolated from alfalfa and fish meal are different. The first was called "vitamin K_1"; the latter, "vitamin K_2." The structure of vitamin K_1, 2-methyl-3-phytyl-1,4-naphthoquinone, has been established by synthesis. This work was done almost simultaneously in several different laboratories.[13] Binkley *et al.*[14] have suggested that vitamin K_2 is a 2,3-disubstituted 1,4-naphthoquinone, the substituent in the 2 position being methyl and the large substituent different from that in vitamin K_1. Several other 1,4-naphthoquinones such as phthiocol (2-methyl-3-hydroxy-1,4- naphthoquinone) and 2-methyl-1,4-naphthoquinone and

others have been shown to possess vitamin K activity.

It is hoped that the designations vitamin K_1 and vitamin K_2 will soon be replaced by names suggestive of the chemical nature of these compounds.

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FEDERAL TRADE COMMISSION STIPULATION ON FLEER'S DUBBLE BUBBLE CHEWING GUM

FRANK H. FLEER Corporation, Philadelphia, engaged in selling a brand of chewing gum designated "Fleer's Dubble Bubble Chewing Gum," has entered into a stipulation with the Federal Trade Commission in which it agrees to discontinue representing that the gum will do away with the gray or dingy condition of teeth, clean them thoroughly and force its way into crevices in teeth that an ordinary toothbrush won't or can't reach; that food particles left between the teeth are the principal cause of bad breath; that chewing the gum will rid one of unpleasant breath or will beautify teeth; that merely chewing the respondent's gum will enable a person to remain or keep awake or alert during drives; that the gum is rich in dextrose or that the dextrose content will help relieve fatigue, give pep or animation, contribute any appreciable energy to a person, or increase vitality or strength in men, women and children; that the gum will be of material benefit in developing well-arranged teeth in children; that the exercise provided by chewing the respondent's gum will enable the teeth of boys or girls to grow straight or strong; that the exercise of the facial muscles provided by chewing the gum constitutes a beauty treatment; that the exercise provided by chewing the gum will bring, give or in any way impart youth to a person's face or facial muscles or keep the facial muscles young, or that chewing the respondent advertiser's gum is a competent aid in or treatment for a great variety of oral disorders or dental diseases or gingivitis, gingival recession or alveolar atrophy, or acute and chronic Vincent's infection or periodontoclasia (pyorrhea).

The Frank H. Fleer Corporation further agrees not to make any unwarranted claims concerning the relative toughness or elasticity of its gum. (Stipulation 02648.)

FEDERAL TRADE COMMISSION STIPULATION ON VITAMINS PLUS

VITAMINS Plus, Incorporated, 370 Lexington Ave., New York, has entered into a stipulation with the Federal Trade Commission in which it agrees to cease certain representations in the sale of a vitamin concentrate supplement designated "Vitamins Plus."

The respondent agrees to cease representing, directly or by implication, that a cloudy or lusterless condition of the eyes or lack of whiteness of the teeth is generally due to vitamin A deficiency; that vitamins are of significance in determining the duration of time hair stays in curl, or make-up remains on the skin surface or nail polish adheres to the nails; that vitamin B will maintain or nourish brain tissue, or will remove lactic acid from the blood stream and thereby eliminate fatigue, or is of value in cases of constipation or nervous disorders, except where and to the extent that such cases may be due to an insufficiency of vitamin B, or that foods customarily consumed have but a negligible amount of vitamin B.

Other representations which the respondent agrees to discontinue are that vitamin E is known to be capable of preventing sterility or promoting mental or physical vigor; that by use of "Vitamins Plus," a person may expect to have sparkling eyes, or gleaming or lustrous hair or a lovely complexion, or one may become active, gay, beautiful or charming, or live without a "let-up" or "let-down." (Stipulation 02652.)

ACCEPTED DENTAL REMEDIES

The Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following articles in the list of Accepted Dental Remedies.

Dentifrices*

Lavco Tooth Paste: Composition: See Sheffield Dental Cream (A.D.R. Ed. 6, p. 120).
Manufactured by the Sheffield Company, New London, Conn. Distributed by Dade Pharmacies, Miami, Fla.

Taylor-Rea Tooth Paste: Composition: See Sheffield Dental Cream (A.D.R. Ed. 6, p. 120).
Manufactured by the Sheffield Company, New London, Conn. Distributed by the Taylor-Rea Corporation, Los Angeles, Calif.

Anesthetics—Local†

Procaine Hydrochloride, 2%, Epinephrine 1:50,000-Abbott: Each cubic centimeter is said to contain procaine hydrochloride, U.S.P., 0.02 gm.; epinephrine, 0.02 mg.; sodium bisulphite, 0.001 gm., and potassium sulfate, 0.009 gm.; in chemically pure water.
Manufactured by Abbott Laboratories, North Chicago, Ill.
Procaine Hydrochloride, 2%, Epinephrine 1:50,000-Abbott in cartridges, approximately 2 cc.

Procaine Hydrochloride Solution 2%-Abbott: Each cubic centimeter is said to contain procaine hydrochloride, U.S.P., 0.02 gm.; potassium sulfate, 0.009 gm., and sodium bisulfite, 0.001 gm.; in chemically pure water.
Manufactured by Abbott Laboratories, North Chicago, Ill.

*A.D.R. Ed. 6, p. 111.
†A.D.R. Ed. 6, p. 38.

Procaine Hydrochloride Solution 2%-Abbott in cartridges approximately 2 cc.

Admission of an article to the list of Accepted Dental Remedies does not imply a recommendation. Information regarding the rules and work of the Council will be sent on request.

HAROLD L. HANSEN, *Secretary.*

COMMITTEE ON LEGISLATION

COURT UPHOLDS VALIDITY OF RESTRICTION ON ADVERTISING CREDIT AND TERMS OF CREDIT*

THE 1938 amendments to the dental practice act of Kentucky included a provision prohibiting the advertising of credit or terms of credit and declaring that such practices constitute unprofessional conduct within the definition of the statute. The plaintiff, a practicing dentist in Kentucky, filed a petition for a declaratory judgment to determine the constitutionality of the restriction.

The court stated that the only question before it was whether the provision in question reasonably affected or promoted public health, morals and safety or the general welfare. It was conceded that if the provision did have such an effect, it was within the power of the legislature to enact it. In the opinion of the court, the same principles of law announced in the cases relating to prohibition of advertising in general by professional persons were applicable to the instant case, because "advertising credit or terms of credit" means nothing more or less than an effort by which the practitioner seeks to bring patrons to his office through the advertised inducements of credit, on enticing and satisfactory terms. All dentists, as well as physicians and members of other professions, are not of equal capacity, and the selection of the particular professional man to treat or represent the individual may be regulated under the police power of the state.

Accordingly, the judgment of Circuit Court upholding the constitutionality of the Kentucky Dental Practice Act was affirmed.—Reynolds *v.* Walz *et al.* (Ky.) 128 S.W. (2d) 734.

*Originally reported in brief in J.A.D.A., August 1939, p. 1375.

LACK OF EVIDENCE IN SUIT TO REVOKE DENTAL LICENSE

THE appellant, in an action to revoke a dental license to practice dentistry in California, had advertised his "immediate restoration dentures," the advertisement stating that they were made according to a secret formula from "the newest plate material in dentistry." The advertisement also stated that the dentures provided the patient with a "natural expression" which "defied detection."

The Board of Dental Examiners in California suspended the appellant's license on the ground that he was guilty of unprofessional conduct in that (1) he had advertised professional superiority

or the performance of professional services in a superior manner, (2) he had made use of advertising statements of a character tending to deceive the public and (3) he had advertised to guarantee dental services.

From the action of the board suspending his license, the appellant, Webster, appealed to the courts and the matter finally reached the District Court of Appeals, Fourth District, California. The court of appeals stated that it did not wish to condone any attempt to circumvent the dental practice act but that, in view of the fact that a license to practice dentistry is a property right, the holder can be deprived of it only on clear and convincing evidence. Since the board had not challenged the truth of the statements in the advertising, it could not be maintained that they (1) mislead the public, (2) claim professional superiority or (3) guarantee any dental service. The board was not entitled to revoke the appellant's license until it had established the accused dentist's guilt. Since the board had failed to do this, it was instructed to reinstate the dentist's license. —Webster *v.* Board of Dental Examiners of California (Calif.), 103, P. (2d) 442.

COUNCIL ON DENTAL EDUCATION

CONGRESS ON DENTAL EDUCATION AND LICENSURE

THE Congress on Dental Education and Licensure will meet at the Stevens Hotel, Chicago, Ill., Saturday, February 15, 1941. Minor J. Terry, chairman of the Council on Dental Education will preside. Following is the program:

Morning Session 10 a.m.

(West Ball Room)

"Professional Education and Licensure."
(Speaker to be chosen)

"Aims of Dental Education."
By John T. O'Rourke, dean of the School of Dentistry, University of Louisville.

"Aims of Licensure in Dentistry."
By Morton H. Jones, secretary, Ohio State Dental Board.

Discussion

Luncheon Session 1 p.m.

(South Ball Room)

"Harvard Plan of Dental Education."
By C. Sidney Burwell, dean, Harvard Medical School.

Discussion

Afternoon Session 3 p.m.

(West Ball Room)

"Philosophy and Procedure of the Examining Process."
By Edward S. Jones, professor of psychology and director of personnel, University of Buffalo.

"Function of the Council on Dental Education."
By J. Ben Robinson, dean of the Baltimore College of Dental Surgery, University of Maryland.

"Functions and Methods of the National Board of Dental Examiners."
By Harold W. Alden, chairman of the National Board of Dental Examiners.

Discussion

An invitation to attend the sessions of the congress is extended to all dental faculties, dental examining boards and college and university officials interested in professional education, and all dentists attending the Midwinter Meeting of the Chicago Dental Society.

Reservations for the luncheon may be made by addressing Harlan H. Horner, Secretary, Council on Dental Education, 212 East Superior St., Chicago, Ill. The luncheon will be $1.50 per plate.

ORAL SURGERY COMPLICATIONS FROM A MEDICO-LEGAL VIEWPOINT

By LEO M. FORD,* L.L.B., J.D., Wheaton, Ill.

THE growth and development of a nation's laws follow the progress of its civilization, the course of its enlightenment and the development of its industrial and commercial enterprises. The jurisprudence of a people constitutes its autobiography. It has been said that a history of law is a history of the human race. Law, however, does not rise above the level of contemporaneous thought and sensibility. The law furnishes an exact index to the status of society and its economic, educational and professional developments. A law never precedes its necessity or the condition to which it applies. Given their laws, one can determine the degree of civilization of a people, the progress they have made in arts and sciences, their mode of existence, their enlightenment, their ideas of right and wrong and their conception of duty toward one another. The development of every industry has been attended with the enactment of laws having special reference thereto, to meet new conditions that arise. Thus, with the rise of intercourse among nations, came the law of commerce. The purchase and sale of commodities gave rise to the law of contract. The injury to individuals in our industrial plants gave rise to the workmen's compensation law. The rights and duties among individuals in our more densely populated society has, in a great measure, produced our law of torts. The relation of doctor and patient is attended with certain special rights and responsibilities and of course has given us the law of malpractice.

The relation of doctor and patient is contractual in character. The general principles of the law of contracts apply. The relation may be created by express agreement between doctor and patient or it may be implied by the acts of the parties and from the circumstances under which it arises. The law imposes certain duties and obligations upon the relationship irrespective of the intentions or wishes of the parties. The welfare of the public is involved, and that consideration is always supreme. The relationship has certain fiduciary qualities, as a practitioner holds the position of the superior. During the negotiations creating the relationship, the parties deal at arm's length and may make any arrangement that is not illegal or unethical. Once the relationship exists, the law considers the doctor's position of advantage and expects of him the utmost good faith in all his dealings. The law justifies the patient in reposing confidence in the doctor and in believing that his welfare will be considered paramount to the personal interests of the doctor.

Dentistry is a branch of the science of medicine, oral surgery a branch of the art of surgery. Oral surgery must necessarily have some relation to the use of the part that is the subject of the operation, with the intent to restore it as nearly as possible to its original usefulness. The treatment of an abscess at the root of a tooth requires the same knowledge of wounds and infections and their cure that is required in the treatment of any infection in any other part of the body, with the added skill required in reaching the seat of the trouble. The legal

*Professor of medical law, Loyola University, School of Medicine, Chicago, Ill.

Read before the Section on Oral Surgery and Medical Relations at the Seventy-Sixth Annual Midwinter Meeting of the Chicago Dental Society, February 15, 1940.

status, therefore, of a dentist is the same as that of the physician. Their rights and obligations are the same. The science of dentistry, of course, is progressive rather than a fixed or an exact science. New discoveries are constantly being made, new theories developed and newer instrumentalities made available to the profession. It is study, experiment and the exchange of ideas in meetings like this that supply the life blood of the profession.

CARE AND SKILL

When a doctor in general practice undertakes to treat and care for a patient, the law construes this relationship as an implied contract, holding that the doctor implies that he possesses the ordinary degree of care and skill generally possessed and exercised by the average practitioner in that or similar localities. Therefore, in determining what constitutes proper care and skill, the elements of time, place and facilities available are vital factors. What is considered proper practice today for a given condition may be considered malpractice in a year and a half or two years from now. As a result, care and skill employed in the treatment of a patient at a given time may vary from accepted practice at the time the case is tried, but what was considered proper at the time the service was rendered is the determining factor. Furthermore, the standard of care and skill varies with the localities of practice.

The law seeks to be impartial and to establish a just rule for both doctor and patient, and the place where the treatment is rendered is an important element in determining what the standard of care and skill is. Many courts have said that the standard of care and skill must be determined by what the average doctor in similar localities does. In other words, the doctor has discharged his responsibility if he follows the treatment generally followed by the average doctor in the same or a similar locality. This rule means that the doctor must exercise the average degree of care and skill possessed by ordinarily and reasonably skilful members of the profession in such localities generally, and not of a standard determined by the average skill in his own locality alone. It has well been said that although the law does not exact the highest degree of care and skill obtainable in the profession, it does not contemplate mere average merit, including the skilful and the unskilful.

In determining who will come up to a given legal standard, we are not permitted to aggregate into a common class the quacks and the charlatans who have no practice, the doctors who have dropped out of practice, the skilled and unskilled, the good and the very best, and then take an average, since such method would place the standard too low. In fixing a standard and striking an average, only the ordinarily and reasonably skilful should be considered. It is not enough to render a doctor liable to show that he has somewhat less skill than some other practitioner might have shown, or that he exercised less care and skill than he himself might have been able to bestow; nor is it sufficient that he acknowledge some want of care; there must have been a want of ordinary skill and care to such a degree as to have led to a bad result.

There is, of course, no basis for complaint, even if the doctor has not complied with the rules of ordinary care, if the patient has not sustained a bad result therefrom. The place where the treatment is rendered, that is, whether in a large city or in a rural community, has a direct bearing on the skill that is required. The skill required of a doctor in a large city naturally is higher than that required of a doctor in the country. In sparsely inhabited communities, where there are insufficient comparative standards by which to measure the degree of care and skill, the test is the degree of care and skill exercised in similar or like

localities. If the doctor has exercised the ordinary degree of care and skill of doctors in similar or like localities, he has met the legal requirement. The doctor in a rural sparcely inhabited community, where hospitals and laboratories are not available, does not have the opportunity to practice his profession with the same high degree of care and skill as is possible when he practices with these facilities readily available. A doctor may therefore possess the degree of care and skill possessed and exercised by the average practitioner in his community, and still in applying his knowledge in arriving at a proper diagnosis be guilty of an error of judgment. For an error of judgment under these circumstances, the law does not hold the doctor liable.

In the absence of evidence, the law indulges in no presumption of want of care or skill. Neither does it imply that care or skill was exercised. The fact that the results of treatment were injurious does not justify an inference of negligence or want of care and skill. The consequences complained of may be the result of the patient's condition; lack of cooperation of the patient or his family, or the disease itself. All the circumstances must be taken into consideration in determining what constituted due care.

If different courses of treatment or procedure may be reasonably applied, and the patient does not limit the doctor to any particular treatment or procedure, naturally the doctor has the right to use his best judgment as to the manner and means of treatment and the procedure to be followed, and he is not liable for negligence or malpractice as long as his conduct is not inconsistent with ordinary care and skill under the circumstances in question. If a practitioner uses his best judgment, he has no liability for an untoward result, even though some other practitioner, under the same circumstances, might have pursued a different course of treatment.

SPECIALIST

However, when a person represents himself as a specialist, the legal requirement of care and skill is higher. The specialist is required to possess a greater degree of knowledge and to exercise a greater degree of care and skill than the general practitioner. The law requires the specialist to bring to the aid of the patient that degree of care and skill that is ordinarily possessed by those who devote special study and attention to the particular specialty, having regard to the advanced state of the profession or specialty at the time in question. The degree of care and skill is not limited to that exercised in the locality of practice, but is based on the care and skill required of oral surgeons generally throughout the entire country. The general practitioner of dentistry therefore has a right to rely on the directions and suggestions given by the oral surgeon. When a general practitioner of dentistry refers a patient to an oral surgeon, both the patient and the referring dentist have every right to expect that the treatment rendered will conform to what can be expected of specialists generally under the same circumstances, throughout the entire country. This higher requirement therefore places greater responsibility upon the specialist and necessarily demands that he keep abreast of the times, if he is to discharge faithfully the obligations which the law imposes upon him. The specialist is therefore in a limited field and is not competent to pass upon the degree of care and skill possessed and exercised by the general practitioner. Conversely, the general practitioner is not capable of giving expert testimony against the specialist. He does not possess the special qualifications of the expert and therefore is not in a position to pass upon the question as to whether the expert has complied with requirements as to care and skill that the law imposes upon him.

If complications develop, the general

practitioner should not delay placing the patient in the hands of a specialist. Thus, the patient has the benefit of being in the hands of an expert, and the general practitioner is relieved of the case.

Complications arise in general surgery. We are all familiar with them. In the same manner, complications arise in oral surgery. Perhaps a discussion of some actual cases will serve best to illustrate the complications and the legal liability arising therefrom. I shall therefore consider some actual cases.

CASES

A general practitioner referred a patient to an oral surgeon for the extraction of the lower right third molar. In extracting the tooth, the jaw was fractured. The fracture was reduced and the bone wired in place. Infection developed and, two months later, the patient developed blindness. He instituted suit against the oral surgeon, alleging negligence in the extraction and in the reduction and stating that, as a result of the improper treatment by the oral surgeon, he suffered total permanent blindness. While the blindness was difficult to explain, it made a dangerous case to present to a jury.

In another case, a general practitioner, in removing a lower right second molar, fractured a root and was unable to remove it. He referred the patient to an oral surgeon, who removed one root, but was unable to remove the other. He did not disclose to the patient the fact that one root remained. The patient later secured dentures and wore them successfully for several years. About ten years subsequent to the extraction, a pathologic fracture of the mandible developed. It was then determined that osteomyelitis had developed at the point where the root remained and finally produced a fracture of the jaw at that point. This result was quite serious, and it was unfortunate that the oral surgeon had not been frank with the patient. His evasion complicated the situation and led the jury to believe that he was guilty of fraud, in that he removed one root and accepted a fee therefor and did not disclose to the patient that he had been only partially successful. A full and frank disclosure should be made to the patient under these circumstances. The dentist should always retain the x-ray pictures in his files.

In another case, an oral surgeon removed a deciduous tooth, and finding what he thought was a root in the gum, he proceeded to remove it. No x-ray film was taken and, after working for some time, he successfully removed the "root," only to find it was a permanent tooth. The parents of the little girl were quite disturbed and, in spite of everything that could be said, and the willingness of the doctor to take care of the child without charge and make all necessary restorations, litigation was started.

The complications arising from the extraction of teeth seem to be on the increase. In many instances, the patient complains that more teeth were extracted than he authorized. This becomes then a question of fact for a jury, and the question of care and skill and the propriety of the treatment does not arise. It thus becomes a question between the patient and the doctor as to whether the latter had the patient's consent to remove a given number of teeth. If he did not have his consent, regardless of the condition of the teeth, he was guilty of a technical assault and must respond in damages to the patient. I would caution you to be careful to see that the patient fully understands that you are going to extract a certain number of teeth before making the extraction. Furthermore, when a general practitioner refers a patient to an oral surgeon, marking on a card the teeth to be extracted, and his examination leaves some question as to whether the particular tooth or teeth marked should be extracted, it would be well for the oral surgeon to call the re-

ferring doctor and confirm his markings on the chart. If the doctor cannot be reached, it is well to postpone the extraction. Extractions of this type are rarely an emergency. Because many errors arise and much litigation develops therefrom, greater precaution on the part of both the referring dentist and the specialist is indicated.

When a tooth fractures during extraction, great care should be taken to see that all the particles are removed. When possible, an x-ray picture should be taken before and after every extraction. It is very common for fractured portions of the tooth to escape notice and to be aspirated into the bronchus and lung, with resultant great damage. Many cases of this type arise annually. Recently, just such a case came to my attention. The history of the case discloses that, after the extraction, the patient began to cough. As she continued to cough, the oral surgeon asked her to return the following day. The cough was even more pronounced at this time and, a few days later, the patient was running a temperature. This continued and she was placed in the hands of the family physician. A lung abscess developed and the physician made a diagnosis of tuberculosis, referring the patient to a higher altitude. While spending the winter in Arizona, the patient, in a paroxysm of coughing, coughed up the tooth. Her condition promptly improved and, in a few months, she came home with no sign of tuberculosis. Suit was then filed against the oral surgeon.

In another case, a two-tooth bridge was missing after an extraction and the doctor advised the patient that he had undoubtedly lost it while making the extraction and rendering the after-care. This patient also developed a cough on the second or third day, which persisted and increased in severity. A few weeks later, a lung abscess developed and the physician in charge had a roentgenogram made of the chest. This disclosed the foreign body, which was removed. The patient regained his health, although he was compelled to be out of work for some time and incurred heavy expenses for medical and hospital care.

These cases indicate that when a cough develops and persists after an extraction, the attending doctor should be very careful to roentgenograph the chest and determine definitely whether a foreign body has been aspirated into the bronchus. The complications which arise are so severe that every precaution should be taken to protect the patient as well as the dentist. In these cases, experts have been free to testify that, in all extractions, the throat should be screened or packed with sterile gauze. It would seem that some precaution should be taken. If it is the technic followed by the ordinary oral surgeon, it would seem that failure to take this precaution would establish negligence or malpractice on the part of the doctor.

In this connection, many claims and suits arise from a filling escaping into the lung or bronchus during extractions. Judging from the great number of claims of this type that arise, I cannot overemphasize the necessity of using the greatest care to safeguard the patient, and I feel that more extensive use of the throat pack is indicated. That is the technic which has been developed, and it is considered proper. If there is no objection to using it, I would urge you to follow it in your daily practice. When complications of this type arise and the doctor testifies that he did not screen the throat, and did nothing when the coughing developed or persisted, the plaintiff or complaining party can readily establish lack of care on the part of the attending doctor. The recovery in this type of case is often substantial, being the source of extracting a great amount of money annually from the pockets of the profession. I believe that a little more care on your part will be very beneficial to both the patient and the profession.

It is very common in the extraction of upper posterior teeth to fracture a root and push it into the antrum. When this occurs, the general practitioner should promptly refer the patient to an oral surgeon.

In many instances, the root of a tooth extends into the floor of the antrum and the extraction of the tooth necessarily opens the antrum. In this type of case, of course, there is no negligence or liability on the part of the general practitioner. However, the opening should be closed, and experience indicates that the oral surgeon is the one most successful in performing this operation. An x-ray picture should always be taken and a root demonstrated in the antrum before any attempt is made to remove it. All antrum washings should be collected and inspected before disposal. The removed root fragment, with the x-ray picture, should remain in the files of the oral surgeon for at least two years if the patient is an adult and longer in the case of a child. If the specialist is not positive that he has removed the root, he should so advise the patient. There are many instances in which the particle is small and the doctor has difficulty in removing it, finally flushing out the antrum. He then advises the patient that the foreign body has been removed. Sometimes this is true and the patient makes a complete recovery without complications. In other cases, the foreign body has not been removed and an infection develops, resulting in severe complications. A full disclosure as to what has occurred is the best course under the circumstances, since the patient is then put on his guard and the oral surgeon has a defense if an action is instituted against him.

Experience indicates that certain extractions should be referred to an oral surgeon in the beginning. When the conditions are such that the general practitioner has doubt as to whether he is properly equipped to perform a given extraction, it is advisable that he refer the patient to an oral surgeon in the beginning, rather than take a chance and then find that the patient's condition has been rendered more serious by his error. The general practitioner should recognize these cases and place the patient in the hands of a specialist in the beginning.

It is not uncommon for a needle to break during a mandibular block injection. I do not believe that there are many cases of this type in which a plaintiff can prevail on an allegation of negligence on the part of the doctor in breaking a hypodermic needle. The difficulty arises from the attempt to remove the broken portion. The field is a complicated one, and unless great care is taken, the mandibular nerve or artery may be severed or the needle be pushed farther into the soft tissue; and thus its extraction be made more difficult. There is also great danger from infection in this field. I have known of many cases in which the damage to the soft tissue from the attempt to remove a broken needle has been extremely serious. Experience would therefore indicate that broken needle cases should be promptly referred to an oral surgeon and the patient informed of the presence of the broken needle. Some doctors contend that a broken needle will be absorbed within a short time, or will become encapsulated and cause no trouble. Other doctors believe that it travels to other parts of the body and may strike a vital center.

Cases are reported in which a broken needle first caused pain seventeen years after the accident. Experience indicates that a doctor's interests are best served by the removal of the broken portion of a needle unless its location is such that surgical measures are contraindicated. In a great majority of cases, the oral surgeon removes the broken needle without complications and the patient recovers within a few days. Under these circumstances, the patient is not likely to institute suit, and perhaps he cannot recover damages. In any event, the recovery

would be very small. However, when a foreign body is allowed to remain, it is always possible for some doctor to give an opinion as to what may happen, that the needle may travel and may in time strike a vital center, causing death or serious injury to the patient.

I believe, therefore, that all broken needle cases should be promptly referred to an oral surgeon for removal. General surgeons usually are not so successful in operations of this type as the surgeon who is frequently called upon to perform operations in this field. A special technic is required to locate the needle and have the area properly marked, which must be done before the operation is performed. A general practitioner who has had no experience in this type of surgery therefore is not usually successful, and futile attempts only make the loss of time and expense greater and increase the possibility of infection, which is present in every operation. After the operation by the general surgeon, an oral surgeon's services are usually required for removal of the needle, and thus the patient must experience two operations. May I suggest therefore that in broken needle cases the general practitioner promptly refer the patient to a competent oral surgeon.

If the oral surgeon is not successful in operating, he should so advise the patient. This information places the patient on his guard, and the law requires him to take steps to protect himself when complications or untoward results follow. The statute of limitations, furthermore, as to any cause of action against the oral surgeon, begins to operate when he makes full disclosure. The patient cannot, therefore, after the expiration of the statutory period, which is two years in Illinois, institute an action against the oral surgeon claiming that the statute of limitations is not a bar, because the doctor concealed from him the fact that a foreign body remained. Any concealment or fraudulent act on the part of a doctor always makes a defense extremely difficult, because a jury is prone to penalize one who has thus taken advantage of a professional relationship and has concealed important facts from the patient, such as the fact that a broken needle has not been removed although an operation was performed and a fee paid for its removal.

The general practitioner when he refers a patient to an oral surgeon should tell the patient the facts—that there is an opening into the antrum, or a root has entered the antrum or a needle has broken and a portion remains. Full disclosure is thus a protection not only to the patient, but also to the doctor. When the patient is a minor, that is, one under legal age, the full disclosure should be made to the parents or the guardian. There are cases of this type in which the patient has refused to have an operation performed for the removal of the foreign body. In this event, the doctor should take the precaution of asking the patient to sign a statement to the effect that he has been advised of the condition and that the doctor has recommended an operation and the patient has refused it. This signed statement should be kept in his files. If this cannot be secured, the doctor should have his nurse or a witness present who can testify as to the conversation should it become necessary. This, from a legal standpoint, is a very important precaution.

Quite often, cases arise wherein a dentist has broken off an instrument during an operative procedure and has failed to remove the broken fragment. These cases are made more serious by failure of the operator to inform the patient of the presence of the broken instrument in the antrum or jaw and to make some effort to have the object removed. The breaking of an instrument may have been caused by a defect therein and may not be due to any negligence on the part of the operator. When the operator discovers that a portion of his instrument is

missing and he takes no steps to locate or remove the part, and does not advise the patient of the accident, the situation is complicated for the doctor and the case will prove extremely difficult to defend.

If a restoration leaves a sharp point or sharp wire in contact with the cheek or tongue, and the irritation is only slight, but is continuous, a potential danger is apparent. Should malignancy develop, and it is not uncommon, the patient may successfully complain that a sharp point irritated the soft tissue and caused the malignancy. It is a fact, and it has been established in medicine and in our courts, that cancer has developed from such irritation. This is a real danger, and the profession should take precautions to be particularly careful to remove all irregularities and sharp edges of teeth.

A general practitioner extracted a lower right third molar. After the extraction, he noticed that the occlusion of the teeth was poor. A few days later, he referred the patient to an oral surgeon, who examined the patient's mouth and noted the malocclusion, but did not determine the cause. The patient returned about six months later, complaining of pain and soreness at the temporomandibular joint. The surgeon then roentgenographed the area and found a dislocation. This condition was of such long standing that the end of the mandible had become resorbed and it was therefore impossible to reduce the dislocation. The patient suffered a permanent disability. This case proves the importance and the necessity of an accurate early diagnosis, confirmed, when possible, by x-ray examination by a competent roentgenologist.

Another patient was suffering from trigeminal neuralgia. The dentist diagnosed the case as an impaction of an unerupted third molar, which was causing the neuralgia by pressure on the inferior dental nerve. In removing the tooth, he severed the inferior dental nerve. The patient was then referred to an oral surgeon, but the damage had been done. This type of case should be referred to an oral surgeon as soon as the diagnosis is made.

In discussing the various types of cases and the complications arising therefrom, it is well to bear in mind that responsibility is not dependent on nor related to the size or source of the professional fee. Where the relation exists, the liability attaches, and the law, from necessity, imposes upon the practitioner the duty to exercise skill, care and judgment, and any default therein resulting in damage to the patient gives rise to a cause of action. That the services were rendered gratuitously or were paid for by a third party is no defense to an action for malpractice.

CONCLUSION

I have endeavored to touch upon the main questions involved in oral surgery complications and the types of cases which actually arise. I wish to leave this thought with you: When you hear of a malpractice case successfully prosecuted, always remember that, in all probability, the success was due to the testimony of some doctor who assumed the rôle of a critic, who was willing to take the witness stand and criticize a fellow practitioner for what he did or failed to do under the set of circumstances which confronted him; and regardless of the fact that he probably knew nothing of the situation which confronted the doctor, the witness now is perfectly willing to criticize and condemn him. It should always be borne in mind that the doctor who treated the case knows more about it than any one else. He may be guilty of negligence, in view of later developments, but do not summarily condemn him.

No profession excels yours in thoroughness of preparation. The true doctor never ceases to be a student, never flags in zeal for more thorough mastery of the mysterious laws of human life and

health. In entering practice, the doctor assumes a grave risk. Both law and public sentiment demand of him a skill which reflects the accumulated experience of the profession from its beginning to the present time and the breadth of a scientific knowledge which is characteristic of the present age. Although a doctor does all a man can do to give to a case the best fruits of earnest study and investigation, he cannot escape carping criticism, and the sick or injured person who is disappointed by his doctor's inability to perform a miracle can easily be persuaded to find solace in a malpractice suit. In such circumstances, a sympathetic jury, stimulated by the sight of a crippled human form, is led to place a brand of undeserved reproach on one who merits the entire confidence and respect of the community. The history of your profession is to a great degree the story of mankind's advancement. The time will perhaps come when mankind will erect memorials in honor of a profession that has done so much for the alleviation of human pain and suffering.

326 East Madison Street.

A-D-A 1941 APPOINTMENT BOOK

EACH year, a limited number of A. D. A. Appointment Books are printed. Each year, many members wait until the last minute to order. Consequently, many members are disappointed in that the limited edition is exhausted before their orders are received.

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A description of the book, together with an order blank is printed on page A-40 of this issue. Fill out, cut out and mail in the order blank today so that you will be sure to receive your book in time.

G. WALTER DITTMAR TO BE HONORED

G. WALTER DITTMAR, professor emeritus of the University of Illinois College of Dentistry, who retired from active teaching duties in September 1940, is to be the guest of honor at a banquet to be held at the Lake Shore Club of Chicago, Saturday evening, February 15, 1941. This date, which is just prior to the opening of the Midwinter Meeting of the Chicago Dental Society, was chosen to allow Dr. Dittmar's many friends throughout the country to attend the banquet.

The faculty of the College of Dentistry and the dental Alumni Association of the University of Illinois are sponsoring this banquet. Further details will be announced later.

OBITUARIES

CHARLES D. COLE, D.D.S.
(1882-1940)

CHARLES D. COLE, D.D.S., F.A.C.D., vice-chairman of the Committee on Dental Legislation of the American Dental Association and a past president of the District of Columbia Dental Society, met a tragic death in an airplane crash August 31, 1940. He was on the way to his parent's home in Michigan, where he had planned to spend a few days prior to attending the annual meeting of the American Dental Association.

CHARLES D. COLE

Born in Conway, Ohio, August 12, 1882, he spent the early years of his manhood in farming. Deciding finally to make dentistry his life work, he entered the dental college of the University of Michigan, where he was graduated in 1916. Immediately after graduation, he settled in Washington, D. C., becoming a member of the American Dental Associa-

tion through the constituent society, the District of Columbia Dental Society. Always active in the affairs of the district society, he served as member or chairman of several committees, for ten years was a member of the Board of Dental Examiners for the District of Columbia and for many years served as a Delegate to the American Dental Association. He served as president of the District of Columbia Dental Society in 1932.

In 1935, he became a member of the Committee on Dental Legislation of the American Dental Association and was at once appointed vice-chairman of the committee, an office which he held until his death.

Dr. Cole possessed a rare sense of obligation to his profession and he gave his support generously and with an indefatigable zeal to every activity that had for its purpose the advancement of the standards and prestige of dentistry, maintaining under every circumstance an alert interest in his profession's welfare, as well as a deep concern for the dental health of the public.

His activity in connection with organized dentistry was marked by an ability, modesty and loyalty that made of him a widely known and conspicuous figure in dental affairs, and his outstanding service in matters relating to dental legislation was generally recognized.

He was particularly active in promoting the congressional legislation that sought to enlarge the Army Dental Corps and to provide the rank of brigadier general for the chief of the Army Dental Service. Those with whom he served and worked were constantly stimulated by his sincerity, his undaunted courage and his devotion to his profession. Willing and able always to defend what he considered right, he was forceful, but kindly and gracious by nature, and these qualities, coupled with his complete unselfishness, won for him respect and very real affection.

He is survived by his widow, the former Henrietta Chase; one daughter, Mrs. Louis Deschler, of Washington, D. C.; two grandchildren, a brother, Frank C. Cole, a dentist of New York City, and two sisters.

Dr. Cole was a thirty-second degree Mason, a fellow of the American College of Dentists and a member of the Columbia Country Club of Washington, D. C.

Capable, generous, and endowed with a personality that won to him many friends, his ready smile and warm hand clasp will be sorely missed. It is with a deep sense of personal loss and a full appreciation of his invaluable service to his profession that the members of the Committee on Legislation join the host of his friends in mourning this loss to the dental profession of an esteemed and valiant co-worker, whose ability and lovable qualities endeared him to all his associates.

A. B. PATTERSON.

PERCY ROY ASHPLANT, D.D.S.

PERCY R. ASHPLANT, a charter member of the New York Society of Orthodontists, died December 17, 1939, at his home in Newburgh, N. Y., after a long illness.

Dr. Ashplant was born in London, Ontario, and received his early education in the public schools and collegiate institute of that province. In the fall of 1902, he entered the Dental Department of the University of Pennsylvania (now the Thomas W. Evans Dental Institute) at Philadelphia. He was graduated in 1905, after making a highly creditable record in his studies and attaining prominence and popularity among his classmates, through characteristics that have endeared him to all his associates throughout his career.

After his graduation, he became associated with Henry C. Ferris in the general practice of dentistry in Brooklyn, N. Y. In March of 1906, he moved to Newburgh, N. Y., where he acquired the long-established practice of Charles F.

Allen. It was here that he became recognized as one of the outstanding dentists of the Hudson River Valley. In 1907, he married Olive Triscott Langridge, who, with a daughter, Marjorie, now Mrs. George M. Smith, survives him.

Eventually, his interest centered in orthodontia, and in 1920 he was graduated from the Dewey School of Orthodontia, returning to Newburgh to practice orthodontia exclusively until the time of his death.

He was a member of St. George's Episcopal Church, Newburgh, the Newburgh City Club and the Powelton Club. He was also a member of the American Dental Association and the Dental Society of the State of New York; a life member of the Ninth District Dental Society, and a member of the Orange-Sullivan Dental Study Club and of the Delta Sigma Delta Dental Fraternity. He served as president of the Ninth District Dental Society in 1920-1921 and was editor of the ninth district bulletin for several years. He was a member of the American Association of Orthodontists and the New York Society of Orthodontists and an honorary member of the Southern Society of Orthodontists.

DEFOREST DAVIS, D.D.S.

1885-1940

ON August 8, 1940, DeForest Davis, formerly of Minneapolis, passed away at the Cleveland Clinic Hospital, Cleveland, Ohio. His death came as a severe shock to his many friends, not only in Minneapolis, but also throughout the entire Northwest. Death apparently was caused by a cerebral hemorrhage following an injury due to a fall in the garage of his apartment building in Cleveland. His death came suddenly and swiftly, ending a fine professional career.

Dr. Davis obtained his primary education at the Carlisle Indian School, Carlisle, Pa. In 1909, he was graduated from the School of Dentistry at the University of Minnesota, and he practiced his profession in Minneapolis until 1928, when he moved to Cleveland and engaged in general practice. He had attained national prominence in his favorite field of restorative dentistry and was known throughout the country through his appearances on dental society programs.

At the time of his death, he was an active member of the Cleveland Dental Society. He was also a member of the Ohio State Dental Society, the American Dental Association, the Academy of Restorative Dentistry and the National Society of Denture Prosthetists and a Fellow of the American College of Dentists. He had served as a member of the Council of the Cleveland Dental Society and was active on many of the committees and advisory groups of that organization.

While in Minneapolis, Dr. Davis took an active and deep interest in all district and state dental activities. He was a member of the Minneapolis District Council for several years and was the society's president in 1925-1926. In 1926, he inaugurated "Home Talent Day," a feature which has become an annual event in the program of the Minneapolis District Dental Society. He was one of the men who early took an interest in the work of the late George S. Monson and for years he was a member of the Monson Study Club.

Perhaps more important than his professional achievements was Dr. Davis' personal influence on all who knew him as a friend. His inspiration, imaginative qualities and enthusiasm seemed to attract and bind men to him. His work was of the highest order and he set standards in his dental service which served as an inspiration to younger men. His friendships always were loyal and his passing has deprived all those who knew him well of an influence that will be greatly missed.

In Dr. Davis' death, dentistry has lost one of its finest exemplars of the best

traditions and practices of the profession. His close friends have lost the thrill of his ready smile, the firm clasp of his hand and the inspiration of all that his personality carried with it.

He is survived by his wife, Gertrude Prescott Davis, and by two daughters, Catherine Davis Baldwin, of South Orange, N. J., and Betty Davis Hughes, of Hasbrouck, N. J.

DEATHS

AMRINE, ROSCOE C., Rushville, Ill.; State University of Iowa, College of Dentistry, 1891; died August 1; aged 72.

BARRETT, MICHAEL T., Philadelphia, Pa.; University of Pennsylvania School of Dentistry, 1903; died August 22.

CHEVIGNY, G. A., Butte, Mont.; died November 11; aged 74.

COBB, E. C., Sun Prairie, Wis.; died August 11; aged 74.

DEYERMAND, WILLIAM J., Lenox, Iowa; died July 30; aged 83.

DOUGLASS, STEPHEN A., Eau Claire, Wis.; died August 2; aged 69.

FORNEY, JOHN W., Osceola, Iowa; Kansas City Dental College, 1904; died September 22; aged 60.

GERHARD, MILTON U., Reading, Pa.; University of Pennsylvania School of Dentistry, 1903; died July 6; aged 59.

GILBERT, GEORGE N., Pana, Ill.; Chicago College of Dental Surgery, 1888; died August 17; aged 77.

HOPKINS, RICHARD SIMPSON, Newark, N. J.; University of Pennsylvania School of Dentistry, 1888; died June 21; aged 73.

HULLHORST, LEWIS, Chicago, Ill.; Northwestern University Dental School, 1902; died October 19; aged 63.

JOHNSON, CHARLES P., Medford, Ore.; Western Dental College, 1912; died recently; aged 53.

JOHNSON, T. M., Luling, Texas; died September 4; aged 62.

LESEMAN, PHILIP B., Nashville, Ill.; University of Louisville School of Dentistry, 1895; died September 18; aged 69.

MCCRAE, H. C., Boone, Iowa; State University of Iowa College of Dentistry, 1892; died August 8; aged 71.

MCLEMORE, W. Y., Mason City, Ill.; died September 17; aged 91.

MARCIN, ANDREW J., Chicago, Ill.; Chicago College of Dental Surgery, 1915; died October 13; aged 55.

MARINO, JOSEPH, Newark, N. J.; University of Pennsylvania Dental School, 1917; died August 10.

MARTIN,, LEWIS ALLAN, Beckley, W. Va.; Baltimore College of Dental Surgery, 1893; died July 6; aged 80.

MOTELET, JOSEPH P., Spring Green, Wis.; Marquette University Dental School, 1919; died March 11; aged 45.

REAVIS, J. J., Lawrenceburg, Tenn.; University of Tennessee College of Dentistry, 1908; died September 6.

ROBERTS, EDWARD O., Cambria, Wis.; Milwaukee Medical College, 1903; died July 5; aged 59.

SAUER, CLARENCE J., River Forest, Ill.; University of Illinois College of Dentistry, 1914; died October 7; aged 46.

SCHINDLER, JOHN G., Bay City, Mich.; University of Michigan School of Dentistry, 1893; died recently; aged 70.

SENGPIEL, JOHN V., Milwaukee, Wis.; Marquette University Dental School, 1915; died June 1; aged 55.

SMELTZER, WARREN H., Chicago, Ill.; Chicago College of Dental Surgery, 1913; died September 8.

SPESSARD, EDWARD W., Ainsworth, Iowa; Northwestern University Dental School, 1900; died September 1; aged 70.

SWAIN, STEPHEN R., Marengo, Iowa; State University of Iowa, College of Dentistry, 1892; died August 12; aged 71.

THEWALT, MYRA L., Milwaukee, Wis., Marquette University Dental School, 1919; died September 30; aged 43.

VICKERS, HARVEY H., Lake Geneva, Wis.; Northwestern University Dental School, 1918; died July 2; aged 49.

WILHELM, SAMUEL E., Sac City, Iowa; Ohio College of Dental Surgery, 1883; died September 4; aged 83.

WILKE, HERBERT F., Milwaukee, Wis.; Northwestern University Dental School, 1918; died July 10; aged 42.

CORRESPONDENCE

"STUDIES ON THE LOCAL FACTORS IN DENTAL CARIES"

To the Editor:

In the November JOURNAL, there appears a letter from Louis I. Grossman, who takes issue with certain statements in the article, "Studies on the Local Factors in Dental Caries," in the September issue. It is difficult to understand how Dr. Grossman can have comprehended this paper so imperfectly as is apparent in his comments.

Section I of this paper shows that dental enamel dissolves in acid solutions in which a pH of 4.2 to 5.0 is maintained. Section II shows that *any* mouth contains bacteria capable of producing this degree of acidity in a medium containing sugar. It is perfectly evident, therefore, that dental enamel *will* dissolve if it is placed in a suitable medium containing a mixture of oral bacteria. Naturally, the next question would be, "Is a pH of 5.0 or less ever encountered in the oral cavity?" This we definitely answer, in the affirmative, in Sections III and IV, in which it is shown that the pH of unwashed carious lesions in teeth in the mouth may be 5.0 or less. To demonstrate this, methyl red was used as an indicator. Litmus is of no value for this purpose because it changes color at a pH of about 7.0, while methyl red changes from yellow to red at a pH of about 5.0. Obviously, while litmus indicates the presence of acid, it does not give such information upon the degree of acidity as does methyl red.

The fact that carious lesions as well as plaques were shown to have a pH of 5.0, in the mouth, where they were subject to the usual contact with saliva, is worthy of special attention. Repeated determinations of the pH and the buffer value of the saliva used in this test were made. All the subjects secreted an alkaline saliva and none were especially subject to caries. This, however, in no wise affects our conclusion that "plaques menace the teeth because sufficient acid can develop in them to dissolve dental enamel." This conclusion is justified by the experimental facts detailed.

Such a determination of the exact degree of acidity as might be accomplished by potentiometric methods would serve no useful purpose because once it has been established that a sufficient degree of acidity to dissolve dental enamel *can* occur in the mouth, even in the presence of saliva, the exact pH, whether it be 5.0 or 4.65, is merely of academic interest. If Dr. Grossman cares to explore this matter further, he will find that the pH of unwashed carious lesions varies from time to time to the extent of several tenths of a point of pH.

Regarding Dr. Grossman's assumption that we do not take cognizance of the buffering action of saliva, we call his attention to the paper upon this subject listed in our bibliography as number 6.

We are perfectly familiar with Dr. Grossman's paper on the pH of carious and non-carious dentin, but consider that because of gross errors in technic, any practical value is destroyed. On page 171, he states that the extracted teeth containing the carious lesions were "washed with distilled water." That this procedure removed most, if not all, of the free acid is indicated by the high pH recorded for carious dentin (6.51), which is approximately the pH of a suspension of tricalcium phosphate in distilled water. Contact of dentin with the acids causing caries leads to destruction of the calcium carbonate that it normally contains. The residual inorganic matter is calcium phosphate. The initial drift in Dr. Grossman's potentiometer readings (he does not state the direction of this drift) shows, moreover, that the final recorded reading is that of an equilibrium mixture

of water and a fairly insoluble substance, not that of the original carious dentin. Nor is there any statement of the amount of dentin suspended. The pH of liquids containing small amounts of weak acids may be influenced considerably by the degree of dilution.

Dr. Grossman refers at length to the article by Nichols, Hatton and Doherty, which is concerned with the action of various agents on mucin films. These authors prepared films of gastric mucin on glass slides and this mucin was treated with sodium chromate, thereby changing its chemical composition. That the authors themselves recognized their experimental method to be highly artificial and not to be applied to "mucin plaques" in the mouth is evidenced by their statement (page 710) that "it should be clearly understood that this discussion has nothing to do with the much discussed and little understood mucin plaque."

It is our opinion that the term "mucin plaque" is a misnomer. The only plaques that we have been able to find consist chiefly of filamentous micro-organisms. This coincides with the findings of J. Leon Williams. Nor do we find that they are apparently attached to the teeth by mucin or any other protein that can be acted upon by pancreatin or papain (section VI). We find the plaque to be a living membrane that disappears as the living fungi are destroyed by fungicides.

As to the time interval during which the solution has been used, Dr. Grossman apparently overlooked the table on page 1388. Our system of checks and controls has been shown in previous studies. The patients have complete dental records, including roentgenograms, extending over many years, as shown in section XI. Also, as stated, they had previously been highly susceptible to caries. That under ordinary circumstances such persons do not suddenly become caries-free is too well known to require comment. That, in addition, caries is fundamentally identical at all ages, it would seem superfluous to state.

Dr. Grossman will find the answers to all of his questions in the last paragraph, in section XI, which we suggest that he read with greater care. We may add that solution 58 is now in use by several hundred patients under the observation of the various members of the Chicago Dental Research Club, and the convictions expressed in the paper under discussion have only been strengthened by this further experimentation.

MILTON THEODORE HANKE, Ph.D.,
and
The Members of the Chicago Dental Research Club.

"HAS IT BEEN PROVED THAT SUGAR IS A SIGNIFICANT FACTOR IN DENTAL CARIES"

To the Editor:

Inasmuch as the exact relationship of sugar to the etiology of dental caries is an important, yet highly controversial subject, it seems proper to submit a correction of the following misstatement appearing in a recent article by Dr. Hopkins.[1]

"A few years ago, Percy R. Howe fed a group of monkeys quantities of sugar in the form of large caramel-like masses. This practice he continued for nine months. During this time, the teeth were not cleaned and the monkeys were fed a well-balanced, adequate diet, which they consumed with no apparent loss of appetite. At the end of the experiment, the teeth were cleaned and carefully examined. Caries had not been produced."

A review of Dr. Howe's reported studies does not confirm this statement. In 1923,[2] he reported: "An excessive

1. HOPKINS, FLORENCE B.: Has It Been Proved That Sugar Is a Significant Factor in Dental Caries? J.A.D.A., 27:1803, 1940.

2. HOWE, P. R.: Some Experimental Effects of Deficient Diets on Monkeys. J.A.D.A., 11:1163, December 1924.

amount of sugar was fed to six animals. One of these developed caries in his superior left permanent molar, and two cavities in his lower molars. The other five showed nothing. So far as could be seen, it was only when the sugar was fed in such a way as to affect the appetite and to produce a systemic derangement that any dental defect could be found." From this report, it seems that caries may occur in monkeys fed sugar, and that they are subject to loss of appetite as are human beings.

In a later report, Howe[3] wrote: "Since the idea that caries is due to local carbohydrate fermentation is so firmly fixed in the minds of many, we have again tried to produce caries by feeding sugar and white flour in such manner that it would adhere to the teeth for long periods. In addition, a candy made by boiling cane sugar and water was fed. In one case, caries was found. In two animals that died after eight and a half months, the teeth were found to be covered with adhesive carbohydrate so that they were cleaned with difficulty, but no caries was found." This indicates that caries may occur in monkeys fed sugar and also that the appetites of two animals were permanently lost, owing to death.

LOUIS M. FLEISCH, D.D.S.,
504 Central Bldg.,
Topeka, Kan.

3. IDEM: Studies of Dental Disorders Following Experimental Feeding with Monkeys. J.A.D.A., 11:1157, December 1924.

PRACTICE IN PARAGRAPHS

Cheek Retractor and Mouth Lamp—An inexpensive and practical accessory to oral diagnostic sets may be made with a minimum of effort by the practitioner. This appliance serves both as a cheek retractor and as a mouth lamp. It is made from a clear instrument handle composed of the newer plastics. Both sides of one end of the handle are reduced on a large stone so that the surface presents two tapering flat planes. Viewed from the end, the handle presents a small rectangle about three-eighths by one eighth inch. The stone cuts are then pumiced and polished until all scratches are removed and the reduced surfaces are absolutely clear. This is most important as any remaining marks will allow the light beams to radiate from the central shaft. The handle is placed in boiling water for a few minutes and then removed, wrapped in a towel and pressed against the bench or other stable object until the tip is bent about 20 degrees from the main shaft. While still warm, the handle may be screwed into the socket of the oral diagnostic set. It is detachable for sterilization and transmits a cool light for surgical and other operative procedure.—*Thurston D. Knowles, D.D.S., 177 Post Street, San Francisco, Calif.*

Removing Plaster and Denture from Flask—In making acrylic resin dentures, removal of the denture and plaster from the flask is greatly facilitated by lining the flask with cellophane before pouring. The use of cellophane makes removal of unvulcanized plaster almost as easy as with the vulcanized rubber dentures. —*H. W. Fallowfield, Jr., Betterton, Md.*

CURRENT LITERATURE

False Ideas About False Teeth

By LeRoy Kurth

The author has presented a simple means of telling the layman about dentures. This is a good article for prospective denture patients to read as well as persons already wearing dentures. It is not an article to be read by the average dentist, but dentists may well profit by having their average denture patients read these few facts about false teeth.—*Hygeia*, 18:763, September 1940.

Arthur F. Fisher.

Cereals and Rickets. XI. Calcium Phytate as a Source of Calcium

By C. H. Krieger, R. Bunkfeldt and H. Steenbock

When calcium phytate was added to a cereal-free, low-calcium ration, its calcium was found to be as readily available to the rat as the calcium of calcium carbonate. Ingestion of vitamin D improved the utilization of both forms of calcium to the same extent.—*J. Nutrition*, 20:15, July 1940.

R. F. Sognnaes.

Decomposition of Carbohydrate Substrates by Dental Plaque Material

By Benjamin F. Miller, John A. Muntz and Sigmund Bradel

Because the authors are convinced that the pathogenesis of dental caries can be explained best by the assumption that dental plaque material, under certain conditions, initiates the early lesions of enamel, an investigation is presented on the ability of plaque material to decompose the more important carbohydrate substrates. They have studied plaque material removed from the teeth of caries-active and of caries-free individuals. The latter were classified as caries free when they showed negative findings upon clinical and roentgenographic examinations, and when, in addition, they gave total saliva counts for lactobacilli and yeasts of less than 1,000 per cubic centimeter. Tests were made on 30-minute incubated cultures of plaque material and glucose for change in pH and lactic acid content. It was found that the quantity of lactic acid and the total pH drop vary with the amount of plaque material. Caries-free individuals possess a plaque substance which produces acid *in vitro* as readily as composite samples from caries-active subjects. Also, plaque material from both types of individuals produces lactic acid from the disaccharides, such as sucrose and maltose, as readily as from glucose, and to a lesser, but still very definite extent, from lactose and starch substrates.—*J. D. Res.*, 19: 473, October 1940.

Virgil D. Cheyne.

Cereals and Rickets: XII. Effect of Calcium and Vitamin D on the Availability of Phosphorus

By C. H. Krieger and Hans Steenbock

In feeding experiments with rats, the availability of phytic acid phosphorus was markedly affected by the calcium and vitamin D content of the diet. The availability of phytic acid phosphorus was considerably decreased with an increasing calcium:phosphorus ratio. This was not true for inorganic phosphorus. Vitamin D improved the utilization of both forms of phosphorus.—*J. Nutrition*, 20:125, August 1940.

R. F. Sognnaes.

Essentials of Caries Statistics and a Suggestion for a Standard

By Gunnar Dahlberg

A plea is made for the adoption of universal standardization of dental caries. Our problem is to get away from a subjective viewpoint and to try to obtain as objective a standard as possible. To this end, the statistical approach is suggested, choosing such boundaries that an appropriate number of cases will fall within the limits defined. If data are distributed on a normal curve of error, the limits should be chosen so that each class embraces one-third of the standard variation. It is emphasized that the scoring of dental caries can best be done with the aid of figures. The inclusiveness of

the figures should depend on the material studied. The perfection of such a standard would do much to prevent the undue expenditure of time and material so often encountered in the present methods of investigation.—*J. D. Res.*, 19:479, October 1940.

VIRGIL D. CHEYNE.

Some Considerations of the Pathology and Treatment of Suppurations Around the Angle of the Mandible

By C. NAYLOR-STRONG

ACUTE inflammatory reactions in and about the angle of the jaw may be divided into the following groups: (a) pericoronal infection around third molars; (b) postoperative infection, and (c) suppuration following injections, usually mandibular. The signs and symptoms vary both in severity and in clinical course. One type is characterized by early signs of trismus, swelling, tenderness and sequestration. The other type is markedly different in that the patient becomes febrile soon after the onset, trismus appears late and the formation of words is impeded. The differences in the signs and symptoms of these two types have been explained on an anatomic basis. The author cites four cases indicating the two sets of symptoms that may occur. Treatment consists of incision and drainage in the more dangerous type II infection, and waiting for sequestration to occur in the first type.—*Proc. Roy. Soc. Med.*, 33:693, September 1940.

A. PEARSON.

Relationship of the Deciduous Dentition to the Normal Growth and Development of the Jaws

By KENNETH ADAMSON

WITH the aid of slides and dissected anatomic specimens ranging from birth to completion of the full dentition, the author demonstrates the forces of growth and their dependence on functional stimuli. The use of the term temporary leads to a false conception of the true value of the first dentition.

Growth proceeds first in a vertical direction, evidenced to a great degree in the increase in height of the body of the mandible. This type of growth continues until all the permanent teeth anterior to the first permanent molar are in position. When the eruption of the deciduous teeth is complete, two new planes of growth, lateral and forward, are noted, both of which are horizontal. The forward growth is transmitted to the more anterior parts of the jaw by the intervening teeth and the bone of the jaw. Thus, the loss of one or more deciduous teeth produces a lack of forward development of the anterior portion, in addition to which the forward or mesial movement from behind continues, resulting in closure of the space occupied formerly by the lost tooth.

Finally, the third molar in young dissected specimens is generally located well under the anterior border of the ramus of the mandible. Contrary to some opinions, space is provided for the eruption of the third molar by concomitant resorption of bone from the anterior border of the ramus, and a deposition of bone on the posterior border. This process facilitates the eruption of the third molar and also increases the length of the body of the mandible.—*Australian J. Dent.*, 44:344, September 1940.

A. PEARSON.

Gastro-Intestinal Diseases and Their Relation to Focal Infection

By WILLIAM E. BIPPUS

SINCE the mouth is the portal of entry for food and the site of beginning digestion, the author maintains that the presence of pathosis in the form of dental abscesses and periodontal lesions can be instrumental in causing or aggravating diseases of the entire gastro-intestinal tract. Such disturbances may range from some form of gastritis to a severe colitis. The author, however, is fully cognizant of the fact that many teeth are indiscriminately removed in the hope of effecting a cure. Teeth should never be removed until they have been shown to be possible foci of infection. —*D. J. Australia*, 12:561, September 1940.

A. PEARSON.

Simplifying of Pyorrhea Treatment

By BERNHARD GOTTLIEB

PYORRHEA should be treated daily from the beginning. All surfaces of the teeth must be thoroughly cleaned by means of pumice and a soft rubber cup. The complete removal of tartar from deep pockets can be facilitated by blowing a stream of oxygen into the pocket, thereby lifting the free gingiva from the tooth. In addition, a small strong light is of great value in illuminating the field of work. The stream of oxygen can be used

further to blow a fine spray of hydrogen peroxide on the field as it becomes obscured by blood. At the end of the treatment, paraffin is applied until the next visit, which should not be more than twenty-four hours later.—*D. J. Australia,* 12:553, September 1940.

A. PEARSON.

Investigation into Pulp Reactions to Various Filling Materials

By C. B. MANLEY

IN the investigation carried out by the author, experiments were conducted to show the relative and total effects of the use of certain filling materials on the dentinal and pulpal tissues. Dogs were used as subjects. The materials tested were silver amalgam, silicate cements, zinc oxide and eugenol, and germicidal cements. The use of all of these materials, excluding the zinc oxide and eugenol paste, resulted in definite pathologic conditions in the dentin and pulp. The changes consisted of secondary dentin formation, calcification of the tubules underlying the cavity, disturbances in the odontoblastic layer and round-cell infiltration of the pulpal tissue. The use of zinc oxide and eugenol caused no change in either of these tissues.—*D. J. Australia,* 12:549, September 1940.

A. PEARSON.

Surgical Pathology of Acute Infections of the Maxillo-Facial Area

By MALCOLM WALLACE CARR

THE incidence of serious acute infections of the face and neck of dental origin is high, and the mortality from the advanced infection is higher than is generally thought. Comprehension of the complex syndrome of the infections may be facilitated by analysis of the syndrome. Treatment should follow a well-planned, logical sequence of procedure.

A section is devoted to the etiology of oral pathosis, including periodontal disease, fusospirochetal infection and periapical disease. The author shows that the mode of extension of the infection may be direct, by anatomic continuity or it may spread independently by way of the vascular channels.

Clinical varieties are classified as acute non-suppurative inflammation and acute suppurative infection. The symptomatology and the diagnosis of these infections are followed by a concluding section on surgical management and on handling anesthesia and the postoperative care.—*Mil. Surgeon,* 87:289, October 1940.

J. F. STRIEGEL.

Relation of Vitamin-D Intake to the Age of the Infant at the Time of Eruption of the First Deciduous Incisor

By I. D. SPEIDEL and GENEVIEVE STEARNS

THE ages in groups of healthy infants were compared at the time of eruption of the first deciduous lower incisor. The diets were carefully controlled and supplemented with low, intermediate and high amounts of vitamin D in three different groups.

With the intermediate vitamin D intake (300-400 units daily), the incisors showed the earliest mean age at eruption as 24.68 weeks. Incisors of infants with a high vitamin D intake, over 1,800 units daily, erupted at a mean age of 27.16 weeks. Those with a low vitamin D intake, from 135 to 270 units daily, erupted at a mean age of 28.29 weeks.

In a small group who had the intermediate intake, but were subject to illness, the mean age at eruption was 29 weeks. This indicates that illness delays the eruption of the teeth and that an earlier eruption age is more normal.—*J. Pediatrics,* 17:506, October 1940.

W. F. KOSS.

Double Radium Mould Treatment of Carcinoma of the Floor of the Mouth and Lower Alveolus

By A. G. G. MELVILLE

RADIOTHERAPY is the treatment of choice in cases of primary carcinoma of the floor of the mouth. A technic worked out by J. S. Fulton and used at the Christie Hospital and the Holt Radium Institute in Manchester, consisting essentially in sandwiching the tumor between a layer of radium in the mouth and a second layer under the chin, is the ideal one for the anterior portion of the mouth floor and alveolar process. The inner layer is carried by a "compo" block on a baseplate made to fit the mouth. The outer layer is an oval tube of radium carried on a nidrose collar molded to the neck and lower jaw. These are applied simultaneously for ten hours a day for ten days with a dosage of 9,000 r. at the mucous membrane and 6,000 r. on the skin. The maximum diameter of the treatable tumor is 3 cm. At Christie

Hospital, 61 per cent of primary lesions thus treated healed and remained healed for three years, and 46 per cent of the patients were alive and free from disease three years after treatment.—*Brit. J. Rad.*, 13:337, October 1940.

H. B. McCAULEY.

Legal Aspects of Radiodontics

By A. P. SWEET

WIDESPREAD use of the x-rays has made the roentgenogram important evidence in malpractice suits. There are three essentials of roentgenographic evidence: (1) quality; (2) a sufficient number of films, and (3) positive identification. The dentist should have a standardized method to expose, process and identify his films. On the witness stand, he should be prepared to recount his professional and radiodontic experience and describe his method of making and identifying his pictures. Although roentgenograms legally belong to the dentist, the two-film packet is preferable for its obvious advantages.

To avoid malpractice suits, it is suggested that the dentist observe the following rules:

1. Use tact. Make known your worst fears.

2. Watch the relatives. Bad feeling is often traceable to brusque treatment of well-meaning relatives.

3. Keep records of everything. Trial lawyers cite the slightest omissions.

4. Place responsibility. If a patient refuses to have an x-ray examination, write him a letter and keep a carbon copy, notifying him that the responsibility is his.

5. Keep calm. Do not come to blows.—*Am. J. M. Juris.*, 2:323, August-September 1939.

H. B. McCAULEY.

Effects of Vitamin C Intake upon the Degree of Tooth Injury Produced by Diphtheria Toxin

By C. G. KING, R. R. MUSULIN and W. F. SWANSON.

GUINEA-PIGS receiving 5.0 mg. of ascorbic acid per day did not present gross or histologic evidence of injury to the teeth when diphtheria toxin was injected intraperitoneally in dosages of 0.4 or 0.8 minimum lethal dose. Comparable animals receiving 0.8 mg. per day of ascorbic acid without toxin injections grew at a normal rate and gave only slight histologic evidence of vitamin C deficiency during the experimental period. The same amounts of toxin resulted in marked injury to the odontoblasts and dentin in the teeth of the animals receiving only 0.8 mg. of ascorbic acid per day.

The authors conclude from this evidence that the need for maintaining a vitamin C intake above that required for normal growth and external evidence of adequate nutrition is clearly indicated.—*Am. J. Pub. Health*, 30:1068, September 1940.

N. S. SIMMONS.

Amitosis in the Epithelium Lining the Oral Cavity of the Cat, Guinea-Pig and Mouse

By EINAR HALS

FETAL and postnatal epithelium from the oral cavity of the cat, guinea-pig and mouse was studied histologically for evidence of binuclear cells (amitosis). It was found that the number of amitotic and binuclear cells varied with the animal and with the developmental stage.

In the cat, amitosis was rare. In the mouse, it was rare in the fetal and neonatal stage, but frequent in the adult. In guinea-pigs, it was frequent in the embryonic stages and also in the adult animals.—*Acta Odontol. Scandinav.*, 2:22, June 1940.

R. F. SOGNNAES.

Fat as a Factor in the Healing of Rickets

By A. KNUDSON and R. T. FLOODY

A RACHITOGENIC diet was prepared that consisted largely of purified materials low in lipoids. An increased healing was observed when the basal diet was supplemented with 5 per cent fat.—*J. Nutrition*, 20:317, October 1940.

R. F. SOGNNAES.

Observations on the Durability of Mottled Teeth

By MARGARET C. SMITH and H. V. SMITH

THE authors, by way of discouraging attempts at mass reduction of caries by the addition of fluorine, within certain limits of concentration, to the drinking water of communities (as suggested by Cox), point out that there is reason to believe that although mottled teeth are somewhat more resistant to caries, they are structurally weak; and when decay begins, the result is often dis-

astrous. They point to a statistical survey of inhabitants of St. David, Ariz., where the water supply contains from 1.6 to 4.0 parts per million of fluorine. Although in the age group from 12 to 14 years, only 33 per cent of the children had caries, nearly 100 per cent had caries in the ages from 21 to 41. In addition, the severity of the result of the onset of caries is evident in the high percentage of all the age groups with extracted teeth. Of the persons from 24 to 41, 50 per cent had had all the teeth extracted and replaced by dentures (a percentage that would seem very high indeed). The authors assert that the tooth structure is so impaired as to crumble on attempts to place fillings, extraction becoming necessary.—*Am J. Pub. Health,* 30:1050, September 1940.

N. S. SIMMONS.

Rôle of Streptococcus in Some Dental Infections: A Study of Residual Areas

By IVA C. YOUMANS and LAURA M. HOBBS

A RESIDUAL area is defined as an abnormality in the soft tissue or in the alveolar bone after the removal of a tooth, particularly an infected one. The study includes cases in which residual areas were diagnosed on general dental examination only, as well as those that presented symptoms generally thought to be due to focal infection. The areas were cultured at operation, under an aseptic technic. The series investigated is small but (1) no sterile cultures were found; (2) in a series of eighteen areas in sixteen patients, sixteen areas showed a nonhemolytic streptococcus, and (3) removal of the selected residual areas caused improvement in the symptoms in almost all the cases.—*South. M. J.,* 33:1140, November 1940.

N. S. SIMMONS.

Malignant Melanoma of the Palate

By H. C. GOTSHALK, C. F. TESSMER and J. W. SMITH

THE authors present a case of malignant melanoma arising from the hard palate, in a feeble-minded Japanese woman aged 25. Dark pigmented spots had been present on the palate since early childhood. The pigmentation became more prominent in 1938. During the next six months, these bluish areas became elevated. In April 1939, the hard palate, including the gums, became a black spongy mass, which bled on the slightest trauma. Diagnosis was established by biopsy May 5, 1939, and the patient died November 20, 1939. At necropsy, metastatic tumor tissue was found throughout the body. The tumor cells occurred in groups and were of a definite epithelial character, with moderately large cells with distinct cytoplasm containing brown granular pigment. The nuclei were large, rounded or oval, hyperchromatic and rather uniform in size, with prominent nucleoli.—*Arch. Path.,* 30:762, September 1940.

JAMES T. GINN.

Black Hairy Tongue: A Report of Three Cases

By CHARLES BARRETT KENNEDY and JAMES K. HOWLES

THE etiology of black hairy tongue is not definitely known, but it is generally agreed that the most common cause is a microorganism. Two of the cases in this report were associated with *M. albicans,* and, in each case, they were secured by placing a cigaret on wood containing growths of this organism. The organisms were cultured from both the tongue and the piece of wood brought by one of the patients. The third case, in a patient with syphilis, presented the same picture as the first two cases. Attempts to culture *M. albicans* in this case were unsuccessful. Therapeutic measures were unsuccessful in all cases. The first and third cases regressed spontaneously after a few months, but the tongue in the second case, sixteen months after the first visit, was unchanged.—*Arch. Derm. & Syph.,* 42:566-569, October 1940.

JAMES T. GINN.

Glossitis and Vitamin-B_2 Complex in Pellegra, Sprue and Allied States

By P. MANSON-BAHR

THIS study is based upon clinical observations made with the object of differentiating etiologically tropical sprue from allied diseases. The author believes that the tongue may be regarded as a mirror of the stomach and intestines; hence, a "raw red tongue, a raw red gut." Glossitis, probably of a similar nature and non-specific to the disease, is found in pellegra, sprue, pernicious anemia, nutritional anemia and idiopathic steatorrhea. Because of this and other features such as changes in the spinal cord, these diseases are

closely related to one another. It is suggested on therapeutic grounds that a deficiency of the vitamin-B_2 complex, which appears to be common to all, may partially explain these phenomena. Nicotinic acid and riboflavin play an important part in treating these conditions.

These diseases are so closely related to one another that borderline cases are often encountered embodying the salient features of two or even more of the group. The opinion is therefore expressed that this group of diseases has as many affinities as there are factors involved (some of which may be obscure). The clinical picture of any one of these diseases varies with the presence or absence of any one or more of these factors. It must be borne in mind that since we are dealing with substances such as vitamin-B_2 complex, the actions of which are somewhat speculative, it is impossible to reach any conclusion except from the therapeutic effects; and this is limited by the fact that the therapeutic agent employed, usually some form of liver extract, may have a multiple action, and may act in a different manner in different diseases.—*Lancet*, 2:317, 365, September 1940.

JAMES T. GINN.

Bacteriologic Studies on Experimental Dental Caries in the Rat. I. Bacterial Flora of Normal, Non-Carious Teeth

By R. W. HARRISON

THE author determined the incidence in normal rat teeth of all the various kinds of micro-organisms that could be cultivated aerobically on some of the more common laboratory mediums. The aerobic flora of normal teeth included streptococci, staphylococci, micrococci, gram-positive and gram-negative bacilli, gram-negative cocci, monilia and filamentous forms. The streptococci, which comprised approximately 60 per cent of the total flora, were almost half acidogenic. About 20 per cent were beta hemolytic and the remainder were equally divided between non-hemolytic and alpha-hemolytic types. There were approximately half as many lactobacilli as acidogenic streptococci.—*J. Infect. Dis.*, 67:91, September-October 1940.

JAMES T. GINN.

Bacteriologic Studies on Experimental Dental Caries in the Rat. II. Changes in Tooth Surface Flora Associated with Development and Inhibition of Dental Caries

By R. W. HARRISON

THE flora of the molar tooth surfaces were studied under various conditions. Dental caries was induced by feeding a coarse, hard-particle diet and inhibited by the administration of fluorides and iodoacetate. Comparison was made with the flora of young rats and also of rats fed a soft diet on which caries did not develop. In cultures on blood-agar, there was an increase in alpha streptococci during the period of earlier development and a decrease in those organisms that was associated with freedom from caries, but not with the presence of caries-inhibitors. A progressive increase occurred in the proportion of lactobacilli during the period when dental caries was developing. There were definite decreases in all groups treated with fluorides and iodoacetate. In the treated caries-diet groups, these decreases paralleled decreases in extent of dental caries. The author found that no other acidogenic and aciduric micro-organisms exhibited changes in incidence which could be correlated directly with those conditions.—*J. Infect. Dis.*, 67:97, September-October 1940.

JAMES T. GINN.

Bacteriologic Studies on Experimental Dental Caries in the Rat. III. Flora of Advanced Carious Lesions

By R. W. HARRISON

THE aerobic flora of a small number of molar teeth, carious and non-carious, were studied quantitatively. The micro-organisms found in carious lesions were studied and compared with the flora found on the surfaces of the same teeth. Streptococci comprised more than 60 per cent of the total flora of these teeth and from 50 to 90 per cent of the acidogenic flora of carious teeth. The author concludes that lactobacilli are associated with surface caries and acidogenic streptococci with advanced decay.—*J. Infect. Dis.*, 67:106, September-October 1940.

JAMES T. GINN.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

ALPHA OMEGA FRATERNITY, Baltimore, Md., December 29-31.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SUBSECTION ON DENTISTRY, Philadelphia, Pa., December 28.

AMERICAN ASSOCIATION OF ORTHODONTISTS, New York, N. Y., May 5-8, 1941.

CHICAGO DENTAL SOCIETY, MIDWINTER MEETING, February 17-20, 1941.

DENTAL PROTECTIVE ASSOCIATION OF THE UNITED STATES, Chicago, Ill., December 16.

DISTRICT OF COLUMBIA DENTAL SOCIETY, second and fourth Tuesdays in each month from October to June at the United States Public Health Service Auditorium, Washington.

FIVE STATE POST GRADUATE CLINIC, Washington, D. C., March 9-13, 1941.

GREATER NEW YORK DENTAL MEETING, Hotel Pennsylvania, New York, December 2-6.

GREATER PHILADELPHIA ANNUAL MEETING, February 4-7, 1941.

UNIVERSITY OF ILLINOIS COLLEGE OF DENTISTRY ALUMNI HOMECOMING DAY, Chicago, Ill., December 11.

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH TWENTIETH ANNIVERSARY, New York, December 20.

NATIONAL BOARD OF DENTAL EXAMINERS, December 2-3.

PACIFIC COAST SOCIETY OF ORTHODONTISTS, San Francisco, Calif., February 20-22, 1941.

PAN AMERICAN ODONTOLOGICAL ASSOCIATION, New York, N. Y., December 4.

XI PSI PHI SUPREME CHAPTER, Lincoln, Nebr., December 28-29.

STATE SOCIETIES

February (1941)

Minnesota, at Minneapolis (25-27)

April (1941)

Alabama, at Birmingham (8-10)
Kentucky, at Louisville (7-9)
Massachusetts (14-17)
Michigan, at Detroit (21-23)
Oklahoma, at Oklahoma City (27-30)

May (1941)

Georgia, at Savannah (19-21)
Illinois, at Peoria (12-15)
Louisiana, at New Orleans (1-3)
Missouri, at St. Joseph (4-7)
Montana, at Missoula (1-3)
New Jersey, at Asbury Park (7-9)
New York, at Buffalo (13-16)
Tennessee, at Nashville (12-15)
Virginia, at Old Point Comfort (5-7)

STATE BOARDS OF DENTAL EXAMINERS

California, at San Francisco, December 16. Kenneth I. Nesbitt, 515 Van Ness Ave., San Francisco, Secretary.

Kentucky, at Louisville, June 10-13. Leon M. Childers, 1312 First Nat'l Bank Bldg., Lexington, Secretary.

Minnesota, at Minneapolis, December 16-21. Elmer J. Sundby, 805 Medical Arts Bldg., Duluth, Secretary.

New Hampshire, at Manchester, December 12-14. Otis M. Littlefield, 913 Elm St., Manchester, Secretary.

New Jersey, December 9-14. Walter A. Wilson, 148 West State St., Trenton, Secretary.

Pennsylvania, at Philadelphia and Pittsburgh, December 10-14. Reuben E. V. Miller, 61 North Third St., Easton, Secretary.

South Dakota, at Sioux Falls, January 24-27, 1941. C. H. Boyden, Mitchell, Secretary.

Texas, at Dallas, December 9-12. B. Carl Holder, 1009 Nixon Bldg., Corpus Christi, Secretary.

Wisconsin, at Milwaukee, December 16-20. S. F. Donovan, Tomah, Secretary.

ALPHA OMEGA FRATERNITY

THE annual convention of the Alpha Omega Fraternity will be held at the Bel-

vedere Hotel, Baltimore, Md., December 29-31.

EMANUEL HOFFMAN, *Publicity Manager,*
827 West 36th St.,
Baltimore, Md.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SUBSECTION ON DENTISTRY

THE next annual meeting of the Subsection on Dentistry of the American Association for the Advancement of Science will be held in Philadelphia, Saturday, December 28. The four dental groups that are recognized by the A.A.A.S. are (1) the International Association for Dental Research (American Division only), (2) the American College of Dentists, (3) the American Dental Association and (4) the American Association of Dental Schools. All members of these groups are urged to attend the Philadelphia meeting.

The program and local arrangements are in charge of J. L. T. Appleton, Dental School, University of Pennsylvania; L. R. Cahn, School of Oral and Dental Surgery, Columbia University, and Paul C. Kitchin, Dental School, Ohio State University, Columbus, Ohio.

Any inquiries regarding membership in the Subsection on Dentistry of the A.A.A.S. or the program of the Philadelphia meeting should be directed to a member of the abovementioned committee.

PAUL C. KITCHIN, *Secretary,*
Ohio State University,
College of Dentistry,
Columbus, Ohio.

AMERICAN ASSOCIATION OF ORTHODONTISTS

THE thirty-ninth meeting of the American Association of Orthodontists will be held at the Waldorf Astoria Hotel in New York, N. Y., May 5-8, 1941.

MAX E. ERNST, *Secretary,*
1250 Lowry Medical Arts Bldg.,
St. Paul, Minn.

CHICAGO DENTAL SOCIETY

SHORTLY after January 1, the preliminary program of the Chicago Dental Society's 1941 Midwinter Meeting, to be held at the Stevens Hotel February 17-20, inclusive, will be in the mails. American Dental Association members residing within a radius of 300 miles of Chicago, as well as all dentists outside this zone who attended the 1940 meeting, will receive copies. Any American Dental Association member who is not in these two categories can secure a copy by addressing the Chicago Dental Society, 30 North Michigan Ave., Chicago, Ill.

LEO W. KREMER, *Secretary,*
30 North Michigan Ave.,
Chicago, Ill.

DENTAL PROTECTIVE ASSOCIATION OF THE UNITED STATES

THE annual meeting of the Dental Protective Association of the United States will be held at the Palmer House, Chicago, December 16, at 4 p.m.

E. W. ELLIOTT, *Secretary,*
55 E. Washington St.,
Chicago, Ill.

FIVE STATE POST GRADUATE CLINIC

THE tenth annual Five State Post Graduate Clinic of the District of Columbia Dental Society will convene at the Mayflower Hotel, Washington, March 9-13, 1941.

WALTER R. RATH, *Chairman,*
Publicity Committee.

GREATER NEW YORK DENTAL MEETING

THE Greater New York Dental Meeting will be held December 2-6 at the Hotel Pennsylvania, New York.

WALTER A. QUINN, *Chairman,*
Press and Publication,
Room 106A,
Hotel Pennsylvania,
New York.

NATIONAL BOARD OF DENTAL EXAMINERS

THE National Board of Dental Examiners will hold its next session for the examination of candidates in Parts I and II, December 2-3, in schools where there are five or more candidates. For information and application, address

MORTON J. LOEB, *Secretary,*
66 Trumbull St.,
New Haven, Conn.

PACIFIC COAST SOCIETY OF ORTHODONTISTS

THE eighteenth general meeting of the Pacific Coast Society of Orthodontists will

be held at the Palace Hotel in San Francisco, Calif., February 20-22, 1941.

EARL L. LUSSIER, *Secretary,*
450 Sutter Bldg.,
San Francisco, Calif.

PAN AMERICAN ODONTOLOGICAL ASSOCIATION

THE fourth annual meeting of the Pan American Odontological Association will be held Wednesday evening, December 4, at the Hotel Pennsylvania, New York, N. Y., during the Greater New York Dental Meeting. A dinner will precede the meeting, at which time several important addresses will be delivered. The profession is invited to attend.

RALPH HOWARD BRODSKY,
Executive Secretary,
205 W. 57th St.,
New York, N. Y.

GREATER PHILADELPHIA ANNUAL MEETING

THE Greater Philadelphia Annual Meeting will be held February 4-7, 1941, at the Benjamin Franklin Hotel.

ABRAM COHEN, *Chairman,*
Publicity Committee,
269 South 19th St.,
Philadelphia, Pa.

ALABAMA DENTAL ASSOCIATION

THE seventy-second session of the Alabama Dental Association will be held at the Tutwiler Hotel, Birmingham, April 8-10, 1941, celebrating the centennial of the world's first dental law, which was enacted in Alabama in 1841.

GEORGE W. MATTHEWS, *Secretary,*
905 Protective Life Bldg.,
Birmingham.

GEORGIA DENTAL ASSOCIATION

THE seventy-third annual meeting of the Georgia Dental Association will be held at Savannah, May 19-21, 1941, with headquarters at the Hotel DeSoto.

R. H. MURPHY, *Secretary,*
Macon.

ILLINOIS STATE DENTAL SOCIETY

THE next annual meeting of the Illinois State Dental Society will be held in Peoria, May 12-15, 1941.

L. H. JACOB, *Secretary,*
Jefferson Building,
Peoria.

KENTUCKY STATE DENTAL ASSOCIATION

THE eighty-first annual meeting of the Kentucky State Dental Association will be held at the Brown Hotel, Louisville, April 7-9, 1941.

J. L. WALKER, *Secretary,*
640 Barbee Way South,
Louisville.

LOUISIANA STATE DENTAL SOCIETY

THE sixty-first annual meeting of the Louisiana State Dental Society will be held May 1-3, 1941, at the Roosevelt Hotel, New Orleans.

JULIAN S. BERNHARD, *Secretary,*
417 Medical Arts Bldg.,
Shreveport.

MASSACHUSETTS DENTAL SOCIETY

THE Massachusetts Dental Society will meet April 14-17, 1941.

PHILIP E. ADAMS,
106 Marlboro St.,
Boston.

MICHIGAN STATE DENTAL SOCIETY

THE eighty-fifth annual meeting of the Michigan State Dental Society will be held in Detroit, April 21-23, 1941.

WILLIAM R. DAVIS, *Secretary,*
Michigan Dept. of Health,
Lansing.

MINNESOTA STATE DENTAL ASSOCIATION

THE fifty-eighth annual session of the Minnesota State Dental Association will be held in the Municipal Auditorium, Minneapolis, February 25-27, 1941.

L. M. CRUTTENDEN, *Secretary,*
498 Lowry Medical Arts Bldg.,
St. Paul.

MISSOURI STATE DENTAL ASSOCIATION

THE Missouri State Dental Association will hold its next meeting in St. Joseph, May 4-7, 1941.

C. W. DIGGS, *Secretary,*
Exchange National Bank Bldg.,
Columbia.

MONTANA STATE DENTAL ASSOCIATION

THE thirty-eighth annual session of the

Montana State Dental Association will be held in Missoula, May 1-3, 1941.

T. T. RIDER, *Secretary*,
9 Higgins Block,
Missoula.

NEW JERSEY STATE DENTAL SOCIETY

THE next annual meeting of the New Jersey State Dental Society will be held in Asbury Park, May 7-9, 1941, at the Berkeley Carteret Hotel.

F. K. HEAZELTON, *Secretary*,
223 E. Hanover St.,
Trenton.

DENTAL SOCIETY OF THE STATE OF NEW YORK

THE Dental Society of the State of New York will convene in Buffalo for its seventy-third annual meeting, May 13-16, at the Statler Hotel. Members of the American Dental Association and the Canadian Dental Association are invited.

LEON J. GAUCHAT, *Chairman*,
Press and Publications,
333 Linwood Ave.,
Buffalo.

OKLAHOMA STATE DENTAL SOCIETY

THE next meeting of the Oklahoma State Dental Society will be held in Oklahoma City, April 27-30, 1941.

O. W. BOYER, *Secretary*,
Perry.

TENNESSEE STATE DENTAL ASSOCIATION

THE seventy-fourth annual meeting of the Tennessee State Dental Association will be held at the Hotel Andrew Johnson, Knoxville, May 12-15, 1941.

HOWARD M. TAYLOR, *Secretary*,
206 Medical Arts Bldg.,
Knoxville.

VIRGINIA STATE DENTAL ASSOCIATION

THE next annual meeting of the Virginia State Dental Association will be held at the Chamberlain Hotel, Old Point Comfort, May 8-10, 1941.

J. E. JOHN, *Secretary*,
Medical Arts Bldg.,
Roanoke.

BOARD OF DENTAL EXAMINERS OF CALIFORNIA

THE next examination by the Board of Dental Examiners of California for license to practice dentistry and for license to practice dental hygiene in California will be given in San Francisco, commencing December 16, at the College of Physicians and Surgeons, College of Dentistry, San Francisco, and at the University of California, College of Dentistry, San Francisco. All credentials must be in the office of the secretary at least twenty days prior to the date of examination. Address all communications to Kenneth I. Nesbitt, Secretary, Board of Dental Examiners of California, Room 203, 515 Van Ness Ave., San Francisco.

KENTUCKY STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the Kentucky State Board of Dental Examiners will be held June 10-13, 1941 at the University of Louisville, Dental School, Louisville. Dentists having graduated prior to 1941 and desiring to stand examination before this board must have filed application, complete with full information requested, at this office not later than April 10, 1941. Applications of 1941 graduates must be in our file by May 30. Ample time should be allowed for securing all data required. For application forms and further information, apply to

LEON M. CHILDERS, *Secretary*,
1312 First Nat'l Bank Bldg.,
Lexington.

MINNESOTA BOARD OF DENTAL EXAMINERS

THE Minnesota State Board of Dental Examiners will hold its next examination December 16-21 at the School of Dentistry, University of Minnesota, Minneapolis.

ELMER J. SUNDBY, *Secretary*,
805 Medical Arts Bldg.,
Duluth.

STATE OF NEW HAMPSHIRE DENTAL BOARD

THE New Hampshire State Dental Board will hold examinations, December 12-14, at Manchester.

OTIS M. LITTLEFIELD, *Secretary*,
913 Elm St.,
Manchester.

STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY OF NEW JERSEY

THE State Board of Registration and Ex-

amination in Dentistry of New Jersey will hold its annual examinations, commencing December 9 and continuing for five days thereafter. On application to the secretary, a copy of the requirements and rules, instruction sheet and preliminary application blank will be sent. Any person desiring to apply as a candidate must file the preliminary application blank, together with the examination fee of $25, on or before March 15 for the succeeding June examinations or before September 1 for the succeeding December examinations.

WALTER A. WILSON, *Secretary,*
148 West State St.,
Trenton.

DENTAL COUNCIL AND EXAMINING BOARD OF THE COMMONWEALTH OF PENNSYLVANIA

THE Dental Council and Examining Board of the Commonwealth of Pennsylvania will conduct examinations in Philadelphia and Pittsburgh, December 10-14. For information and application blanks, address the Department of Public Instruction, Bureau of Professional Licensing, Dental Division, Harrisburg, or

REUBEN E. V. MILLER, *Secretary,*
61 North Third St.,
Easton.

SOUTH DAKOTA BOARD OF DENTAL EXAMINERS

THE South Dakota State Board of Dental Examiners will hold its next examination at the Carpenter Hotel, Sioux Falls, January 24-27, 1941. Applications should be in the hands of the secretary ten days before the date of the meeting. For further information, address

C. H. BOYDEN, *Secretary,*
Mitchell.

TEXAS BOARD OF EXAMINERS

THE Texas Board of Dental Examiners will hold its next examination December 9-12 in Dallas. Applications must be filed at least ten days prior to the date of examination. For further information, address

B. CARL HOLDER, *Secretary,*
1009 Nixon Bldg.,
Corpus Christi.

STATE OF WISCONSIN BOARD OF DENTAL EXAMINERS

THE Wisconsin Board of Dental Examiners will hold its next meeting at the Marquette Dental School, Milwaukee, to examine applicants for license to practice dentistry and dental hygiene December 16-20. Applications and required fee must be in the hands of the secretary not later than December 10. Address all communications to

S. F. DONOVAN, *Secretary,*
Tomah.

EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS OF THE NAVY

A COMPETITIVE examination to select candidates for appointment in the Dental Corps of the Navy will be held December 2 at the Naval Medical School, Washington, D. C., Naval Training Station, Great Lakes, Ill., and Naval Training Station, San Diego, Calif. A candidate for appointment in the Dental Corps must be a citizen of the United States, between 21 and 32 years of age at the time of appointment, and a graduate of a standard dental college. A circular which contains full information relative to the Dental Corps and describes the method of making application for appointment can be obtained from the Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

DENTAL INTERNSHIPS

APPLICATIONS for dental internships are now being received at the Baltimore (Md.) City Hospitals. Senior students interested can obtain application blanks by writing to the superintendent, Baltimore City Hospitals, 4940 Eastern Ave., Baltimore, Md. Applications should be in by February 1, 1941.

P. J. MCMILLIN, *Superintendent.*

UNIVERSITY OF ILLINOIS COLLEGE OF DENTISTRY

ALUMNI HOMECOMING DAY

ALUMNI Homecoming Day of the University of Illinois College of Dentistry will be celebrated December 11, with an all day session at the college, 808 South Wood St., Chicago, and a banquet in the evening at 6:30 at the Lake Shore Athletic Club. Dean Marjerison will be the guest of honor.

POSTGRADUATE COURSE OFFERED BY THE NEW YORK UNIVERSITY COLLEGE OF DENTISTRY

(Correction)

IN the announcement in the November

JOURNAL of the course in fixed bridge construction to be given by the New York University College of Dentistry, the tuition fee should have been quoted as $100. The dates are Friday afternoon, 2:30 to 7:30, January 31-March 28, 1941. Apply to the Dean, New York University College of Dentistry, 209 East Twenty-Third St., New York, N. Y.

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH TWENTIETH ANNIVERSARY

THE twentieth anniversary of the International Association for Dental Research will be celebrated with a dinner under the auspices of the New York Section, organized in New York, N. Y., December 10, 1920. The celebration will be held at the St. Moritz Hotel, December 20 at 7 p.m. The occasion will be formal; ladies invited; dinner, $3.50 per plate. Speakers: Wilmer Souder, president of the association; William J. Gies; Ephraim M. Bluestone, director of Montefiore Hospital, and Leigh C. Fairbank, Brigadier General, Dental Corps, United States Army. Send check for reservations before December 7 to David Tanchester, chairman, Dinner Committee, 180 West 58th St., New York, N. Y.

XI PSI PHI FRATERNITY

THE annual meeting of the Supreme Chapter of Xi Psi Phi Fraternity will be held at the Lincoln Hotel, Lincoln, Nebr., December 28-29.

FRANK W. MCDONALD, *Supreme President.*

RESEARCH FELLOWSHIPS IN MEDICINE AND DENTISTRY BY THE GRADUATE SCHOOL OF THE UNIVERSITY OF ILLINOIS

THE Graduate School of the University of Illinois has established four research fellowships to be awarded for one year in the fields of medicine and dentistry in Chicago at a stipend of $1,200 per year (calendar year with one month's vacation). Fellows are eligible for reappointment in competition with the new applicants.

Candidates for these fellowships must have completed a training of not less than eight years beyond high school graduation. This training may have been acquired in any one of the following ways, or the equivalent thereof:

1. Work leading to the B.S. and M.D. degrees (In some instances the candidates would have the M.S. degree, or an additional year or two of hospital training beyond the intern year).

2. Work leading to the B.S., M.S. and D.D.S. degrees.

3. Work leading to the B.S. or B.A. degree in a four-year collegiate course and to the D.D.S. degree.

4. Work leading to the B.S., D.D.S. and M.D. degrees.

Candidates should indicate the field of research in which they are interested and submit complete transcripts of their scholastic credits, together with the names of three former science teachers as references. March 1 is the dead line for acceptance of applications. Announcement of the fellowship awards will be made April 1, becoming effective September 1.

Formal application blanks can be secured from the secretary of the Committee on Graduate Work in Medicine and Dentistry, 1853 W. Polk St., Chicago, Ill.

CIVILIAN DENTISTS WANTED FOR DUTY WITH CIVILIAN CONSERVATION CORPS

A NUMBER of vacancies will exist in the Civilian Conservation Corps in the Eighth Corps Area wherein the services of dentists can be utilized as civilian employes (dentists) or as contract dentists. Applicants must be graduates of Class A dental schools. Applications should be addressed to the Surgeon, CCC, Headquarters Eighth Corps Area, Fort Sam Houston, Texas. Consideration will be given to applicants as follows:

1. Dental Reserve Corps officers can be placed on duty under Classification P-2 at the initial rate of pay of $2,600 a year.

2. Dentists who are not members of the Dental Reserve Corps can be placed on duty as contract dentists at the initial rate of pay of $2,600 a year.

Both of the above-mentioned groups must consider themselves physically qualified and, if selected, they must report to their first place of assignment at their own expense. If found physically qualified at that time, they will be appointed at the respective rates. Upon being relieved from duty either at their own request or for the convenience of the government, the dentist must bear the expense of return transportation.

ATTENTION: DENTAL GRADUATES OF COLUMBIA AND C. D. O. S.

ATTENTION is called to the fact that all C. D. O. S. graduates are eligible to membership in the Columbia Alumni Association. The dues are nominal and the benefits manifold. Requests for membership should be accompanied with statement as to year of graduation, office held, if any, and other information of importance for the records.

LOUIS I. ABELSON,
200 W. 59th St.,
New York, N. Y.

UNITED STATES PATENTS APPLICABLE OR PERTAINING TO DENTISTRY ISSUED DURING OCTOBER 1940

October 1

No. 2,216,307, JOHN E. ARGUE. Dental contourlator.

No. 2,216,333, HARRY CALVIN WHITE. Antisepticized brush.

No. 2,216,354, DELMER I. PLETCHER. Dosage regulator and control wedge for hypodermic syringes.

No. 2,216,425, ALBERT WERKENTHIN. Artificial tooth.

No. D-122,815, JOHN J. CROSBY. Design for a combined toothbrush and tongue cleaner.

October 8

No. 2,216,816, RUDOLPH A. KUEVER. Dentifrice.

No. 2,216,821, HOMER D. LONG. Dentifrice.

No. 2,217,237, IVAR E. SIQVELAND. Dental filling matrix and method.

No. 2,217,390, FRANCIS TAUB. Dry heat thermoplastic denture press.

No. 2,217,439, LESLIE L. FULLER. Oral massaging device.

No. 2,217,602, JESSE CONRAD SMITH. Hypodermic needle.

October 15

No. 2,217,917, HAROLD W. MUNRO. Dental floss holder.

No. 2,218,072, GARLAND D. RUNNELS. Tongue brush and scraper.

No. 2,218,172, VAMAN R. KOKATNUR. Preparation for antisepsis of the oral cavity.

No. 2,218,290, LUCAS MORICICH. Tooth paste container.

October 22

No. 2,218,738, LOUIS K. BOYSEN. Mouth freshener and dental cleanser implement.

No. 2,218,774, MEYER STRELL. Dental matrix adjuster and retainer.

No. 2,219,058, SAMUEL STREIM. Dental crown and method of forming same.

No. 2,219,089, SAMUEL JAMES EVERETT. Hypodermic needle mount.

No. D-123,254, CLIFFORD A. WILLIAMS. Design for a toothbrush.

October 29

No. 2,219,301, WILLIAM ERHARD. Hypodermic unit.

No. 2,219,417, WALTER E. FURR. Sterilizer for hypodermic syringes.

No. 2,219,538, GEORGE A. YANTIS. Dental casting apparatus.

No. 2,219,559, JOHN A. LENTZ. Apparatus for orienting models in the construction of dentures.

No. 2,219,640, CHARLES E. SUMMY. Skeleton form frame for sprue formers.

No. 2,219,753, TED W. SEQUIN. Toothbrush.

No. 2,220,053, ARTHUR F. PRUNER. Rotary toothbrush.

INDEX TO VOLUME 27

1940

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Index to Pages by Months

January	1-168	May	665-834	September	1377-1540
February	169-332	June	835-1000	October	1541-1700
March	333-496	July	1001-1172	November	1701-1860
April	497-664	August	1173-1376	December	1861-2052

A

Abbott, G. Dangerous Water. (Cur. Lit.) 162

Abrasions, Treatment for. Prescribing Suggestions. (Council Dent. Ther.) 1831

Abrasive Paste, Dental. Prescribing Suggestions. (Council Dent. Ther.) 787

Abscess, Alveolar, Mandibular, of a Deciduous Molar, Cavernous Sinus Thrombosis Resulting from: Report of Case. Harvard D. Jacobs. 1641

"Abscesses"; Ten-Fifteen Year "Cures." Charles W. Riggall, Jr. 361

Accepted Dental Remedies. (Council Dent. Ther.) 283, 790, 959, 1139, 1312, 1513, 1671, 1989

Accidents, Dental Practice, Res Ipsa Loquitur as Applied to. Leslie Childs. (Legis. Com.) 792

Broken Instrument in the Jaw. A. D. Barber. (Incs. of Prac.) 988

Acetanilide-Containing Nostrums and Mixtures, Health Hazards in. Paul J. Hanzlik. (Council Dent. Ther.) 1505, 1672, 1833

Allergy to. G. Sidney Jacks. (Incs. of Prac.) 489

Acetone, Treatment of Paradentosis and Hypertrophic Gingivitis by the Use of. Philip S. Haley. 511

Acquin, Federal Trade Commission Stipulation on. (Council Dent. Ther.) 789

Acrylic Resins. (Res. Com.) 960

Aid in Deflasking Partial Plates When Acrylic Resins Are Used. F. D. Steckman. (Prac. in Par.) 321

Du Pont Company Agreement with Regard to Use of, in Dentistry. (Process Patent Committee). 963

Stabilizing Color in. Alfred T. King. (Prac. in Par.) 1854

(Actinomycosis, Clinical, Bacteriologic Findings in.) H. A. Gins and Elfriede Paasch. (Cur. Lit.) 1372

Destruction of Bacteria in, by Ultra-Violet Rays.) M. Welsch. (Cur. Lit.) 485

New Species, Pathogenic for Man. George C. H. Franklin. (Cur. Lit.) 653

Adams, R. Charles, and Adrian O. Hubbell. Intravenous Anesthesia for Dental Surgery with Sodium Ethyl (1-Methylbutyl) Thiobarbituric Acid. 1186

Adamson, Kenneth. Relationship of the Deciduous Dentition to the Normal Growth and Development of the Jaws. (Cur. Lit.) 2009

Adenocarcinoma Arising from the Mucous Glands of the Palate with Pulmonary Metastases (Case Report). J. G. Sharnoff and J. R. Lisa. (Cur. Lit.) 653

Metastatic, in the Lower Jawbone. Rudolf Kronfeld and Joseph Weinmann. (Cur. Lit.) 1370

Salivary Gland, Minor, Intra-Oral. J. Wirth. (Cur. Lit.) 485

Adenoids and Tonsils, Enlarged, Observations on 1,136 Cases of. C. Rolleston. (Cur. Lit.) 320

Advertising by Dentists, Power of State Dental Boards to Pass Rules Restricting. Samuel R. Lewis, Jr. 403

Al Viola Dental Plate Tightener and Reliner, Federal Trade Commission Order on. (Council Dent. Ther.) 1310

Alloys, Gold Inlay Casting, Certified. (A.D.A. Specification.) (Res. Com.) 792

Gold Wire, Wrought, Certified. (A.D.A. Specification.) (Res. Com.) 794

Alumni, Dental, Society, Your. (Editorial). 1961

Amalgam Alloys, Certified. (A.D.A. Specification). (Res. Com.) 791

Manipulation: Manual Vs. Mechanical Aids. Part II. Comparison of Clinical Applications. James T. Sweeney. 1940

Uncontrolled Variables in, with Significant Improvements in the Making of Restorations. James T. Sweeney. 190

Ambulance, Dental, American, First, Sent to England. (Assn. Acts.) 1327

Gift from the United States Now Operating in England. (Assn. Acts.) 1841

American Association of Dental Editors. Qualifications and Duties of a Dental Editor. (Assn. Acts.) 1523

American Board of Orthodontics. H. E. Kelsey. 1271

American Dental Association

Cleveland, Last Call for. President's Message. Arthur H. Merritt. 1494

Cleveland Next: "The Centennial Year of American Dentistry." President's Message. Arthur H. Merritt. 940

Dues of: Should They be Increased? President's Message. Arthur H. Merritt. 284

Eighty-Second Annual Session, Cleveland, Ohio. (Assn. Acts.) 632, 803, 969, 1329, 1357, 1520

Inner Workings of. President's Message. Arthur H. Merritt. 1122

Insurance Committee, Report of. (Assn. Acts.) 795

Membership. (Assn. Acts.) 452

(Membership.) What Is the American Den-

Index abbreviations: Abstr., Abstract; Assn. Acts., Association Activities; Bibliog., Bibliographical; Bur. Pub. Rel., Bureau of Public Relations; Corres., Correspondence; Council Dent. Ther., Council on Dental Therapeutics; Cur. Lit., Current Literature; Disc., Discussion; Econ., Economics; Extr., Extract; Incs. of Prac., Incidents of Practice; Legis. Com., Legislative Committee; Prac. in Par., Practice in Paragraphs; Res. Com., Research Commission.

tal Association Doing for Me? President's Message. Arthur H. Merritt. 122
National Health Program Committee. (Assn. Acts.) 286
Officers and Trustees, Directory of. 1, 665, 1861
Process Patent Committee. (Assn. Acts.) 129
Relief Fund of, a Non-Member's Contribution to. (Assn. Acts.) 130
Research Activities of. Arthur H. Merritt. President's Message. 776
Research Commission of, Midyear Report of. (Assn. Acts.) 620
Secretary, Abstract from the Report of, on Some of the Activities of the Association During the Year Past. (Assn. Acts.) 126
Secretary, Executive, for. (Assn. Acts.) 630
Standards for Dental Papers. (Assn. Acts.) 1159

American Hospital Committee, Report of. (Assn. Acts.) 132

American Medical Association and the Sherman Anti-Trust Act. (Assn. Acts.) 1142
Platform of. (Assn. Acts.) 287

American Pharmacopeial Convention. (Assn. Acts.) 131

American Public Health Association, Proceedings of, 1939. 633

American Red Cross Notice—Medical Technologists. (Assn. Acts.) 631
President's Message. Arthur H. Merritt. 1123

Amitosis in the Epithelium Lining the Oral Cavity of the Cat, Guinea-Pig and Mouse. Einar Hals. (Cur. Lit.) 2011

Ammonia, Aromatic Spirit of. Prescribing Suggestions. (Council Dent. Ther.) 1832

Amputation, Spontaneous, of the Tongue: Case Report. Samuel Richman. (Cur. Lit.) 1368

(Amyl Nitrite.) Inhalant in High Arterial Pressure. (Council Dent. Ther.) 1832

Anacin, Quinine Dermatitis from. J. Lamb. (Cur. Lit.) 482

Analgesics. Prescribing Suggestions. (Council Dent. Ther.) 445, 446, 617

Anatomy
Anatomic Principles as Applied to Dentistry. T. Seward. 1021
Fossa, Canine. W. J. Millinger. (Cur. Lit.) 1370
Mandible, Unusual Anatomic Markings in. M. Schneider. (Incs. of Prac.) 1531

Anemia, Nutritional, Relation of Vitamin C Deficiency to. H. Aron. (Cur. Lit.) 483

Anesthesia and Anesthetics
Agent, Suitable, for Exodontia and Oral Surgery, Selecting a. James R. Cameron. (Cur. Lit.) 161
Canine, Fossa. W. J. Millinger. (Cur. Lit.) 1370
Cyclopropane. R. H. Robbins. (Bibliog.) 1654
Dental, in Children. Comparison of Vinyl Ether and Ethyl Chloride in a Series of 200 Cases. J. O. French, M. L. Hooker, R. B. Vanse and A. L. Robinson. (Cur. Lit.) 992
Discovery of. (Editorial) 438
General, Technic for, in Surgery of the Mouth. George W. Christiansen. 1575
Intravenous, for Dental Surgery with Sodium Ethyl (1-Methylbutyl) Thio-Barbituric Acid. Adrian O. Hubbell and R. Charles Adams. 1186
Intravenous, in Office Practice for Operations in Exodontia and Oral Surgery: Based on Experience of 946 Cases. Oran K. Bullard. (Cur. Lit.) 827
Local. (Council Dent. Ther.) 283, 790, 1139, 1989
Local: Its Application in Operative Dentistry. Glenn W. Berry. (Cur. Lit.) 1164
Local, Solutions of Procaine with Epinephrine, Value of Potassium in. M. L. Tainter and A. H. Throndson. 71
Prescribing Suggestions. (Council Dent. Ther.) 447, 617
Pressure. David Waldman. (Prac. in Par.) 157
Procaine and Other Drugs, Observations in the Pharmacology of. John A. Higgins. 10
Procaine Solutions. (Council Dent. Ther.) 1139, 1989
Selection and Administration of, Responsibility of the Dentist in. Leslie Childs. (Legis. Com.) 1514
Surface. D. Lawrence Harris. (Prac. in Par.) 1854
Vinethene, in Dentistry and Oral Surgery, Scope and Utility of. S. Cartin. (Cur. Lit.) 486

Anfricht, Gustave. Dental Molding, Compound Cast and Adhesive Strapping in Rhinoplastic Surgical Procedure. (Cur. Lit.) 1688

Angle School of Orthodontia, Eastern Association of Graduates of, Contribution of, to the Science and Practice of Orthodontia. (Bibliog.) 1654

Ankylosis, Temporomandibular, and Its Surgical Correction. Don H. Bellinger. 1563

Anomalies
Incisors, Erupting Upper Central, Three Sets of. M. H. Bernards (Incs. Prac.) 987
Lip, Lower, Double, Surgical and Anatomical Aspects of Case of, Michael C. Mason and Lindsay E. Beaton. (Cur. Lit.) 652
Mammals, Wild, of the Orders Insectivora and Carnivora, Supernumerary and Missing Teeth in, with Some Notes on Disease. E. Raymond Hall. (Cur. Lit.) 1525
Oral Deformity, Congenital, and Its Correction. David Bellock. 1627
Teeth, a Third Set of? George B. Winter. 110

Anson, Barry J., Michael L. Mason and Lindsay E. Beaton. Surgical and Anatomical Aspects of a Case of Double Lower Lip. (Cur. Lit.) 652

Anthropology
Jaw, Lower. Ales Hrdlička. (Cur. Lit.) 1851

Antiseptics, Commercial, Bactericidal Properties of. W. A. Bittenbender, E. F. Degering, P. A. Tetrault, C. F. Feasley and B. H. Gwynn. (Cur. Lit.) 1528
Disclosing Solution. Prescribing Suggestions. (Council Dent. Ther.) 1831
Effect of, on Wounds. A. Fleming. (Cur. Lit.) 1527
Prescribing Suggestions. (Council Dent. Ther.) 617, 1670, 1831
Talbot's Solution, Diluted, Prescribing Suggestions. (Council Dent. Ther.) 1311

Antisialagogue. Prescribing Suggestions. (Council Dent. Ther.) 1512

Applebaum, Edmund. Radiopaque Surface Layer of Enamel and Caries. (Cur. Lit.) 826
Daniel E. Ziskin and Theodora N. Salmon. Effect of Thyroparathyroidectomy at Birth and at Seven Days on Dental and Skeletal Development of Rats. (Cur. Lit.) 1167

Applegate, Oliver C. Use of the Paralleling Surveyor in Modern Partial Denture Construction. 1397

Appleton, J. L. T. The Bacteriologist Looks into the Patient's Mouth. 171
and Louis I. Grossman. Resterilization of Dental Instruments by the Use of Alcohol and Flaming. 1632

Appointment Book, A.D.A. 1940, 1941. (Bur. Pub. Rel.) 143, 1132, 2000

Armstrong, W. D. In Vitro Experiments on the Exchange of Phosphates by Enamel and Dentin. (Cur. Lit.) 1526

Army Dental Corps, Examination for Appointment in. 167, 999, 1171
Army Corps Areas, Headquarters of, and Dental Surgeons in Charge. (Assn. Acts.) 1820

Aron, H. Relation of Vitamin C Deficiency to Nutritional Anemia. (Cur. Lit.) 483

Arthritis, Rôle of the Dentist in. Bernard I. Comroe. 1209

Articulation
Temporomandibular Joint, Some Controversies Over the. L. B. Higley. 594

Articulator, Nature's. (Prac. in Par.) 322

Asbell, Milton B. Roentgenographic Diagnosis. (Incs. of Prac.) 1530
Ascorbic Acid, Observations on the Amount of, Required to Maintain Tissue Saturation in Normal Adults. E. Neige Todhunter and Ruth C. Robbins. (Cur. Lit.) 994
Asgis, Alfred J. Public Health Dentistry and Health Security. (Bibliog.) 1119
Asherson, N. Acute Osteomyelitis of the Superior Maxilla in Young Infants. (Cur. Lit.) 1369
Ashley-Montagu, M. F. Mediopalatine Bones. (Cur. Lit.) 1689
Atlas of Dental and Oral Pathology. (Assn. Acts.) 797
Atropine Sulfate. Prescribing Suggestions. (Council Dent. Ther.) 1512
Austin, Louie T. Relationship of Dental Sepsis to Systemic Disease. 684
Aykroyd, W. R., B. G. Krishnan and R. Passmore. Stomatitis of Dietary Origin. (Cur. Lit.) 485

B

Bachmann, G., J. Haldi, W. Wynn and C. Ensor. Effect of High Calcium and Phosphorus Intake on the Calcium and Phosphorus Balance. (Cur. Lit.) 483
Bachus, Ollie. Speech Rehabilitation Following Excision of the Tip of the Tongue. (Cur. Lit.) 1689
Bacteremia, Streptococcus Viridans, Following Extraction of Teeth. H. D. Palmer and Myrna Kempf. (Cur. Lit.) 654
Bacteriology
Acids, Sugar, Fermentation of. G. Robbin and K. Lewis. (Cur. Lit.) 482
(Aerobic Growth of Anaerobic Dental Bacteria). A. Illenyi. (Cur. Lit.) 320
Anachoric Effect of Chronic Periapical Inflammations. Julius Csernyei. (Cur. Lit.) 651
(Bacteria, Destruction of, in Actinomycosis by Ultra-Violet Rays.) M. Welsch. (Cur. Lit.) 485
Bacteriologist Looks into the Patient's Mouth. J. L. T. Appleton. 171
Caries, Dental, Clinical and Bacteriologic Studies on. S. F. Bradel and J. R. Blayney. 1601
Caries. Destruction of Plaques and Retardation of Bacterial Growth, in the Oral Cavity. I. Studies on the Local Factors in Dental Caries. Milton Theo. Hanke. 1379; (Corres.) 2005
Dentin, Bacteriologic Status of, After Cavity Preparation. Samuel Seltzer. 1799
Electrosterilization, Bacteriologic Evaluation of. Harry Zelson. 1896
Fluorine, Effect of, on Mouth Bacteria. B. G. Bibby and M. VanKesteren. (Cur. Lit.) 1851
Lactobacilli from Carious Teeth, Acid-Production as a Basis for Classifying. H. R. Sullivan, J. L. Still and N. E. Goldsworthy. (Cur. Lit.) 651
Lactobacilli, Studies on. I. Fermentation Reactions of Strains Isolated from Human Mouths. R. Harrison. (Cur. Lit.) 485
(Leptotrichia, Anaerobic, Contributions to Serologic Differentiation of.) Razi Maner. (Cur. Lit.) 317
(Leptothrix, Bacteriology of, A Contribution to.) Erhard Nieber. (Cur. Lit.) 1369
Localization, Bacterial, and Vascular Spasm. A. J. Nedzel. 1285
(Mucin, Action of, in Bacterial Infection.) Genesio Pacheco and J. Norohna Peres. (Cur. Lit.) 1167
of Trench Mouth and Its Treatment. Charles Dillon. (Cur. Lit.) 1850
Root Canals, Infected, Methods of Testing for Bacterial Growth During the Treatment of. Edgar D. Coolidge. 25
Sterilization of Surgical Instruments, Studies on. 1. A Bacteriological Evaluation. E. H. Spaulding. (Cur. Lit.) 160
Baker, Charles R. Mail Order Orthodontics. 408
Baker, Zelma, Benjamin F. Miller and R. W. Harrison. Action of a Quaternary Ammonium Type of Wetting Agent on Metabolism of Micro-Organisms Associated with Dental Caries. (Cur. Lit.) 824
Banyai, A. L., and R. J. Fitzgerald. New Treatment of Oral Tuberculosis. 1647
Barber, A. D. Broken Instrument in the Jaw. (Incs. of Prac.) 988
Barrett, L. G. Dangers in Treating Vincent's Infection by the Spray Method. (Incs. of Prac.) 488
Bauer, William. Development and Etiology of the Dentigerous Cyst. 904
Beach, J. Wright. Ethics the Soul of Dentistry. (V) 1239
Beall, John R. Revision of American Dental Association Specification No. 4 for Inlay Casting Wax. (Res. Com.) 1140
and W. T. Sweeney. American Dental Association Specification No. 3 for Dental Impression Compounds: First Revision—1939. 713
Bear, Harry. Dental Organizations in the United States: A Century of Achievement. 425
Beaton, Lindsay E., Michael L. Mason and Barry J. Anson. Surgical and Anatomical Aspects of a Case of Double Lower Lip. (Cur. Lit.) 652
Becks, Hermann. Human Saliva. VII. A Study of Rate of Flow of Resting Saliva. (Cur. Lit.) 158
and W. W. Wainwright. Human Saliva. IX. The Effect of Activation on Salivary Flow. (Cur. Lit.) 158
Behrman, Howard T., and Oscar L. Levin. Pigmentation of the Face Following X-Ray Examination of the Jaw. 1599
Bellock, David. A Congenital Oral Deformity and Its Correction. 1627
Bell, Robert A. Recruit Selection. (Cur. Lit.) 1852
Belladonna, Tincture of. Prescribing Suggestions. (Council Dent. Ther.) 1513
Bellinger, Don H. Fractures and Dislocations of the Jaws and Wounds. (Cur. Lit.) 486
Temporomandibular Ankylosis and Its Surgical Correction. 1563
Benda, Clemens E. Growth Disorder of the Skull in Mongolism. (Cur. Lit.) 995
Bender, I. B., and G. C. Tassman. Gaucher's Disease: Report of a Case. 1268
Berglund, Karl Van Lear, and Walter Rehrauer. Dental Abnormalities in Recruits. (Cur. Lit.) 1165
Berke, Joseph D. Maxillary Sinusitis and Obscured Partial Impaction as Causes of Dental Pain of Undetermined Origin. 57
New Findings in the Histology and Pathology of Human Enamel. 1229
Berman, Jacob K. Synopsis of the Principles of Surgery. (Bibliog.) 1813
Bernards, M. H. Three Sets of Erupting Upper Central Incisors. (Incs. of Prac.) 987
Bernier, Joseph L. Follicular Odontomata. (Cur. Lit.) 1370
Bernstein, F. G., and J. Bevelander. Effect of Artificially Induced Fever on the Structure of the Developing Teeth of the Rat. (Cur. Lit.) 1168
Berry, Glenn W. Local Anesthesia: Its Application in Operative Dentistry. (Cur. Lit.) 1164
Bersook, H., M. Y. Kremers and C. G. Wiggins. Relief of Symptoms of Major Trigeminal Neuralgia (Tic Douloureux). (Cur. Lit.) 1693
Bertwistle, A. P., and H. T. Roper-Hall. Tender Teeth: Their Gingival Importance. (Cur. Lit.) 1852
Bevelander, J., and F. G. Bernstein. Effect of Artificially Induced Fever on the Structure of the Developing Teeth of the Rat. (Cur. Lit.) 1168
Bibby, B. G., and M. VanKesteren. Effect of Fluorine on Mouth Bacteria. (Cur. Lit.) 1851
Bippus, William E. Gastro-Intestinal Diseases and Their Relation to Focal Infection. (Cur. Lit.) 2009

Bismuth Line in the Mouth, Significance of. James T. Sweeney. (Incs. of Prac.) 986
Bite, Closed, Causing Incessant Swallowing and Throat Distress. Henri A. Tosca. (Incs. of Prac.) 1531
Correcting, Time Saver in. G. Sidney Jacks. (Prac. in Par.) 321
Bite-Rim Construction, Simplified. G. Sidney Jacks. (Prac. in Par.) 1533
Biting Power, Intermaxillary Relation Established by. Ralph H. Boos. 1192
Bittenbender, W. A., E. F. Degering, P. A. Tetrault, C. F. Feasley and B. H. Gwynn. Bactericidal Properties of Commercial Antiseptics. (Cur. Lit.) 1528
Blanquie, Raoul H. Consideration of the Surgical Treatment of Periodontal Lesions. 757
Blauch, Lloyd E. Problems in Dental Education. 219
Blaustein, S., and C. Ferguson. Dental Cooperation in Diabetes Mellitus. (Cur. Lit.) 484
Blayney, J. R., and S. F. Bradel. Clinical and Bacteriologic Studies on Dental Caries. 1601
Block, W. C., F. R. Spencer and C. F. Hagner. Benign and Malignant Tumors of the Jaw. (Cur. Lit.) 1688
Blood Pressure, Normal. (Cur. Lit.) 826
Boder, Elena, and Oscar Reiss. Congenital Cranial Osteoporosis: Its Etiology and Significance. A Study of Eight Hundred New-Born Infants. (Cur. Lit.) 1368
Bogert, L. Jean. Dietetics. (Bibliog.) 1965
Bone and Tooth Development, Relations of Endogenous and Exogenous Factors in: Teeth of the Grey-Lethal Mouse. Hans Grünburg. (Cur. Lit.) 1853
Mandible, Ossifying Fibroma of, Calcium and Phosphorus Metabolism in. K. P. Klassen and G. M. Curtis. (Cur. Lit.) 161
Bones, Mediopalatine. M. F. Ashley-Montagu. (Cur. Lit.) 1689
Bonner, J. F., R. S. Manly and H. C. Hodge. Light Scattering in Normal Human Dentin. (Cur. Lit.) 1526
Boos, Ralph H. Intermaxillary Relation Established by Biting Power. 1192
Boos, William F. The Poison Trail. (Bibliog.) 1297
Borish, A. L. Burning Tongue. (Incs. of Prac.) 657
Boucher, Carl O. Studies of Displacement of Tissues Under Dentures. 1476
Bowes, Anna De Planter. Food Values of Portions Commonly Used. (Bibliog.) 774
Boyd, Julian D. Factors in the Control of Dental Caries of Children. (Cur. Lit.) 316
Rôle of Diet in the Control of Dentinal Caries. 750
Boyd-Cooper, B., B. Fickling and Paul Pincus. M & B 693 in the Saliva. (Cur. Lit.) 653
Boyens, Paul J. Value of Autosuggestion in the Therapy of "Bruxism" and Other Biting Habits. 1773
Boyle, Paul E., David Weisberger and C. Truman Nelson. Development of Caries in the Teeth of Albino Rats Following Extirpation of the Salivary Glands. (Cur. Lit.) 654
Bradel, S. F., and J. R. Blayney. Clinical and Bacteriologic Studies on Dental Caries. 1601
Benjamin F. Miller and John A. Muntz. Decomposition of Carbohydrate Substrates by Dental Plaque Material. (Cur. Lit.) 2008
Brandhorst, O. W. Dental Literature. 267
Brashears, W. N., W. G. Edmonds and T. E. Drewett. Improving the Mastication Efficiency and Facial Esthetics in a Case of Gross Prognathism of the Upper Jaw by Means of Oral Surgery. (Cur. Lit.) 1372
Brekhus, Peter J. Laboratory Facilities for Dental Research in Basic Sciences at the University of Minnesota. 358
Bremner, M. D. K. Story of Dentistry. (Bibliog.) 773
Brenner, George P. A Functional Denture Technic. 1573
Brewer, John H. Antibacterial Effects of the Organic Mercurial Compounds with Special Reference to Their Use as Germicides for the Sterilization of Surgical and Dental Instruments. (Council Dent. Ther.) 276
Brice, S. E. Construction of Lower Anterior Pontics Without Display of Gold. 575
Bridge Abutments, Two-Surface Inlays for. Harold J. Cutler. 1260
and Crown Prosthesis. Stanley D. Tylman. (Bibliog.) 1814
Fixation, Positive Mechanical. D. W. Phillips. 1418
Fixed Restorations and Their Management. P. M. Kyprie. 1591
Fixed, Restorations, Some Important Aspects of. Arthur O. Klaffenbach. 738
Pontics, Anterior, Lower, Construction of, Without Display of Gold. S. E. Brice. 575
Bronchoscopy, Dental Phases of. Paul Holinger. 184
Brown, Angus M., and James B. Davidson. Management of Fractures of the Maxilla. (Cur. Lit.) 1370
Brown, J. B. Double Elongations of Partially Cleft Palates and Elongations of Palates with Complete Clefts. (Cur. Lit.) 992
"Bruxism" and Other Biting Habits, Value of Autosuggestion in the Therapy of. Paul J. Boyens. 1773
Buechele, Keith L. Composite Odontoma. 1479
Bullard, Oran K. Intravenous Anesthesia in Office Practice for Operations in Exodontia and Oral Surgery: Based on Experience of 946 Cases. (Cur. Lit.) 827
Bunkfeldt, R., C. H. Krieger and H. Steenbock. Cereals and Rickets. X. The Availability of Phytic Acid Phosphorus. (Cur. Lit.) 1691
C. H. Krieger and H. Steenbock. Cereals and Rickets. XI. Calcium Phytate as a Source of Calcium. (Cur. Lit.) 2008
Bunting, Russell W., and Thomas J. Hill. Textbook of Oral Pathology. (Bibliog.) 937

C

Cady, F. C. Dental Health Organizations in State Departments of Health in the United States. (Cur. Lit.) 316
Problem of Dental Care in the Public Health Program. (Proc. Am. Public Health Assn., 1939) 633, 1528
Cahn, Lester R. Red Marrow in the Jaws. 1056
Calcification
New Sublethal Color Mutation in the House Mouse. Hans Grünberg. (Cur. Lit.) 1527
Calcium and Phosphorus Intake, High, Effect of, on Calcium and Phosphorus Balance. J. Haldi, G. Bachmann, W. Wynn and C. Ensor. (Cur. Lit.) 483
Metabolism and the Teeth. Rudolf Kronfeld. (Cur. Lit.) 828
Phytate as a Source of Calcium. XI. Cereals and Rickets. C. H. Krieger, R. Bunkfeldt and H. Steenbock. (Cur. Lit.) 2008
Callaway, George S. Contraindications for Space Maintainers in the Mouths of Children. 1091
Calox Tooth Powder, Federal Trade Commission Order on. (Abstr.) (Council Dent. Ther.) 448
Cameron, James R. Selecting a Suitable Anesthetic Agent for Exodontia and Oral Surgery. (Cur. Lit.) 161
Campbell, James. Dental Disease in Pregnancy. (Cur. Lit.) 1850
Campbell, K. H., and C. P. Richter. Taste Threshold and Taste Preferences of Rats for Five Common Sugars. (Cur. Lit.) 1529
Canby, C. Oral Foci of Infection as Related to Diseases of the Kidney. (Cur. Lit.) 483

Cancer (See also Carcinoma)
Intra-Oral, Early Diagnosis of. Peter A. Nelson. 1644
of the Accessory Sinuses, Roentgen Diagnosis of. G. E. Pfahler and J. H. Vastine, 2d. (Cur. Lit.) 1692
of the Mouth. H. E. Martin and E. L. Sugarbaker. (Cur. Lit.) 1691
of the Tongue in Young Subjects. George W. Saleeby. (Cur. Lit.) 1168
of the Tongue, Surgical Treatment of. Leland R. Cowan. (Cur. Lit.) 992
Skin and Lip, Life Expectancy and Mortality from. S. Peller. (Cur. Lit.) 1692
Cantor, Meyer O., and Daniel J. Leithauser. Massive Doses of Lugol's Solution in Acute Secondary Parotitis. (Cur. Lit.) 995

Carbohydrates, Bacterial Dissimilation of. C. H. Werkman. (Cur. Lit.) 319

Carcinoma (See also Cancer)
of the Floor of the Mouth and Lower Alveolus, Double Radium Mould Treatment of. A. G. G. Melville. (Cur. Lit.) 2010
of the Parotid Gland in Youth. T. Case. (Cur. Lit.) 319
of the Tongue, Metastases from. Maurice D. Sachs. (Cur. Lit.) 1168
Tongue, Spontaneous Amputation of: Case Report. Samuel Richman. (Cur. Lit.) 1368

Caries, Dental
Acid Production as a Basis for Classifying Lactobacilli from Carious Teeth. H. R. Sullivan, J. L. Still and N. E. Goldsworthy. (Cur. Lit.) 651
Action of a Quaternary Ammonium Type of Wetting Agent on Metabolism of Micro-Organisms Associated with. Benjamin F. Miller, Zelma Baker and R. W. Harrison. (Cur. Lit.) 824
An Unsweetened Tooth Cannot Decay! L. M. Waugh. (Bur. Pub. Rel.) 1124
and Dental Hypoplasia Among the Children of Finnish Lapps. Helen Mellanby. (Cur. Lit.) 1372
and Enamel, Radiopaque Surface Layer of. Edmund Applebaum. (Cur. Lit.) 826
and Endemic Fluorosis. (Editorial) 1115
and Nutrition in Primitive and "Civilized" Greenlanders.) P. O. Pedersen. (Cur. Lit.) 653
and Osteomalacia. G. F. Taylor and C. D. M. Day. (Cur. Lit.) 1850
Artificial, Produced by Streptococcus Viridans. Carolyn Hammond and Ruth Tunnicliff. (Cur. Lit.) 992
Carbohydrate Degradation by Mouth Organisms. II—Yeast. L. S. Fosdick and G. D. Wessinger. 203
Carbohydrate Substrates, Decomposition of, by Dental Plaque Material. Benjamin F. Miller, John A. Muntz and Sigmund Bradel. (Cur. Lit.) 2008
Clinical and Bacteriologic Studies on. S. F. Bradel and J. R. Blayney. 1601
Dental Disease in the Island of Lewis. J. D. King. (Cur. Lit.) 1371
Dentin, Carious and Non-Carious, pH of. Louis I. Grossman. (Cur. Lit.) 1168
Dentinal, Rôle of Diet in the Control of. Julian D. Boyd. 750
Development of, in the Teeth of Albino Rats Following Extirpation of the Salivary Glands. David Weisberger, C. Truman Nelson and Paul E. Boyle. (Cur. Lit.) 654
Dietary and Metabolic Studies of Eskimo Children with and Without. Eli H. Siegel, Leuman M. Waugh and Maxwell Karshan. (Cur. Lit.) 653
Enamel, Preferential Mottling of, of Rat Molars. S. F. Dixon and G. J. Cox. (Cur. Lit.) 487
Etiology of, Digest of: Introducing a New and Original Hypothesis. Cecil D. Hearman. (Cur. Lit.) 159
Etiology of, Search for. (Editorial) 113
Experimental, in the Rat, Bacteriologic Studies on. I. Bacterial Flora of Normal, Non-Carious Teeth. R. W. Harrison. (Cur. Lit.) 2013
Experimental, in the Rat, Bacteriologic Studies on. II. Changes in Tooth Surface Flora Associated with Development and Inhibition of Dental Caries. R. W. Harrison. (Cur. Lit.) 2013
Experimental, in the Rat, Bacteriologic Studies on. III. Flora of Advanced Carious Lesions. R. W. Harrison. (Cur. Lit.) 2013
Experimental, in the Rat, Effects of Selective Salivary Gland Extirpation upon. Virgil D. Cheyne. (Cur. Lit.) 319
Experimental, Inhibition of, by Fluorine in the Absence of Saliva. Virgil D. Cheyne. (Cur. Lit.) 824
Experimental. III. System of Recording Corn Meal Caries in Rats. Gerald J. Cox, Mary L. Dodds, Sara F. Dixon and Margaret C. Matuschak. (Cur. Lit.) 824
Experimental. IV. Fluorine and Its Relation to Dental Caries. Gerald J. Cox, Margaret C. Matuschak, Sara F. Dixon, Mary L. Dodds and W. E. Walker. (Cur. Lit.) 991
Experimental Rat, Reduction of, by Fluorine. Harold C. Hodge and Sidney B. Finn. (Cur. Lit.) 160
Factors in Saliva Correlated with. Maxwell Karshan. (Cur. Lit.) 159
Fever, Artificially Induced, Effect of, on the Structure of the Developing Teeth of the Rat. J. Bevelander and F. G. Bernstein. (Cur. Lit.) 1168
Findings and Conclusions on Its Causes and Control. (Bibliog.) 117, 1965
Fluoride in Drinking Water and. C. A. Mills. (Cur. Lit.) 825
Fluorides, Adsorption of, by Enamel, Dentin, Bone and Hydroxyapatite as Shown by the Radioactive Isotopes. J. F. Volker, H. C. Hodge, H. J. Wilson and S. N. VanVoorhis. (Cur. Lit.) 1691
Fluorine and Dental Caries Problem. Gerald J. Cox. 1107
Graphic Drama of. Thaddeus P. Hyatt and Alfred J. Lotka. (Bibliog.) 937
Has It Been Proved That Sugar Is a Significant Factor in? Florence B. Hopkins. 1801; Louis M. Fleisch. (Corres.) 2006
Hydrogen-Ion Concentration, Changes in, on Tooth Surfaces and in Carious Lesions. Robert M. Stephan. 718
Immunity, Proximal. Trim Houston. (Bur. Pub. Rel.) 1504
in Children, Association of, with Sex, Age and Environment. Hilda Kaiser and Bion R. East. 1430
Insurance of Children Against. Henry C. Sandler. (Bur. Pub. Rel.) 460
Lactobacilli, Studies on. I. Fermentation Reactions of Strains Isolated from Human Mouths. R. Harrison. (Cur. Lit.) 485
Lactobacilli, Studies on. II. Type-Specific Immunological Reactions of Oral Strains. R. Harrison, Z. Zidek and E. Hammens. (Cur. Lit.) 317
Lesions, Carious, Importance of a Detailed Clinical Examination of. Reidar F. Sognnaes. (Cur. Lit.) 993
Lesions, Carious, in Teeth, a Method for Staining. G. Gomori. (Cur. Lit.) 1526
Measurements, Physical, on Negro, Navajo and White Girls of College Age. Morris Steggerda. (Cur. Lit.) 1164
Mottled Teeth, Observations on the Durability of. Margaret C. Smith and H. V. Smith. (Cur. Lit.) 2011
of Children, Factors in the Control of. Julian D. Boyd. (Cur. Lit.) 316
Prevalence Experience at Initial Examinations and Incidence of New Carious Lesions After a One-Year Interval in 1,047 Officers and Enlisted Men of the United States Navy. (Cur. Lit.) 651
Reduction of, by Dietary Supplement. Mark D. Elliott and Dorothea Nicoll. (Proc. Am. Public Health Assn., 1939.) 639
Relation of Nutrition to; a Review of Recent Findings. L. M. Fleisch. 550
Saliva of Eskimos, Biochemical Studies of. Maxwell Karshan, Eli H. Siegel and Leuman M. Waugh. (Cur. Lit.) 653

Saliva: Short Account of a Property Previously Undescribed. Paul Pincus. (Cur. Lit.) 828
Statistics, Essentials of, and a Suggestion for a Standard. Gunnar Dahlberg. (Cur. Lit.) 2008
Studies on. Henry Klein and C. E. Palmer. (Cur. Lit.) 1526
Studies on the Local Factors in. Louis I. Grossman. (Corres.). 1846
Studies on the Local Factors in. I. Destruction of Plaques and Retardation of Bacterial Growth in the Oral Cavity. Milton Theo. Hanke. 1379; (Corres.) 2005
Sugar, Rôle of, in the Etiology of Dental Caries. Philip Jay. 393
Sugars, Natural and Refined, Effects of, on Oral Lactobacilli and Caries Among Primitive Eskimos. Donald B. Waugh and Leuman M. Waugh. (Cur. Lit.) 991
Teeth, Solvent Action of Various Substances on: A Quantitative Determination. John W. Trask, Edwin E. Ziegler and Edward C. Maloof. 1013
(Vitamin C Deficiency in Relation to Paradental and Carious Lesions.) F. Ruspa. (Cur. Lit.) 1526
Carr, Malcolm Wallace. Surgical Pathology of Acute Infections of the Maxillo-Facial Area. (Cur. Lit.) 2010
Cartin, S. Scope and Utility of Vinethene Anesthesia in Dentistry and Oral Surgery. (Cur. Lit.) 486
Case, T. Carcinoma of the Parotid Gland in Youth. (Cur. Lit.) 319
Casting, Platinum-Iridium: A New Concept of the Dental Casting Process. Ernest R. Granger. 1718
Gold, Effect of Varying Conditions on the Time Required to Cast, Under Air Pressure. Raymond E. Myers and K. R. Pfeiffer. 530
Small, Selection and Use of Investments, Sprues, Casting Equipment and Gold Alloys in Making. William H. Crawford. 1459
Caughron, G. Sherrill, Everett S. Lain and William Schriever. Problem of Electrogalvanism in the Oral Cavity Caused by Dissimilar Dental Metals. 1765
Caul, H. J., and W. T. Sweeney. Denture Rubber: Composition, Properties and a Specification. 1446
Cavity Preparation
Cavities, Compound, of Molars and Bicuspids, Simple Technic for Obtaining Better Gingival Margins by the Direct Inlay Method in. S. J. Fischer. (Prac. in Par.) 157
Cavity Lining. Prescribing Suggestions. (Council Dent. Ther.) 1512
Gold Foil Restoration, Refinement of. George A. Ellsperman. 342
Ce-Kelp, Federal Trade Commission Stipulation on. (Council Dent. Ther.) 788
Cellophane. Alfred T. King. (Prac. in Par.) 985
Cements
Form, Celluloid, and Silicate, Removing. Michael I. Kalman. (Prac. in Par.) 985
Harmful Effect of, Under Orthodontic Bands, Histological Evidence of. William Lefkowitz. (Cur. Lit.) 992
Quick-Setting. Thurston D. Knowles. (Prac. in Par.) 1533
Sedative, Gardinier—Not Acceptable for A. D. R. (Council Dent. Ther.) 119
Silicate, Certified. (A. D. A. Specification.) (Res. Com.) 795
Silicate: Investigation by a Group of Practicing Dentists Under the Direction of the A. D. A. Research Fellowship at the National Bureau of Standards. George C. Paffenbarger. 1611
Temporary. Prescribing Suggestions. (Council Dent. Ther.) 788
Zinc Phosphate, Certified. (A. D. A. Specification.) (Res. Com.) 795
Centenary Celebration, Dental, Baltimore, Md., March 18, 19, 20, 1940. (Assn. Acts.) 132, 450, 644
Anesthesia, Discovery of. (Editorial) 438
Baltimore, On to. (Editorial) 435
Baltimore, On to. President's Message. Arthur H. Merritt. 449
Call. 297
Centennial, Cleveland, of American Dentistry. (Editorial) 604, 1650
Centennial of American Dentistry. Arthur H. Merritt. 1794
"Centennial Year of American Dentistry," Cleveland Next. President's Message. Arthur H. Merritt. 940
Dinners, Nation Wide. (Assn. Acts.) 131
Dinners, One Hundredth Anniversary, Component Society to Hold, on March 11. (Assn. Acts.) 288, 450, 947
Harris, Chapin A. (Portrait) 303
Hayden, Horace H. (Portrait) 300
Hotel Rates, Schedule of. 315
Organizations, Dental, in the United States: A Century of Achievement. Harry Bear. 425
Proceedings of, Publication and Sale of. 999
Program, Preliminary, for. 298
Welcome to. 313
Chemistry
Reagents, Organic, Used in Quantitative Inorganic Analysis. Wilhelm Prodinger. (Bibliog.) 1813
Cherniak, Ralph. Tooth Fusion. (Incs. of Prac.) 989
Chewing Gum, Fleer's Dubble Bubble, Federal Trade Commission Stipulation on. (Council Dent. Ther.) 1988
Cheyne, Virgil D. Description of the Salivary Glands of the Rat and a Procedure for Their Extirpation. (Cur. Lit.) 486
Effects of Selective Salivary Gland Extirpation upon Experimental Dental Caries in the Rat. (Cur. Lit.) 319
Inhibition of Experimental Dental Caries by Fluorine in the Absence of Saliva. (Cur. Lit.) 824
Children's Dentistry
Appeal, Three to Six. W. J. Pelton. (Bur. Pub. Rel.) 1496
(Extraction of the First Permanent Molar During Childhood.) Guttorm Toverud. (Cur. Lit.) 993
Fears. How Childhood Fears Toward Dentistry Can Be Controlled. George E. Morgan. 766
Manual of Reference for. Dental Committee of the Health Council, Community Chest of San Francisco. (Bibliog.) 1120
New Technical Adaptations in the Practice of Dentistry for Children. Floyde Eddy Hogeboom. 64
Pulp Treatment, Contraindications for, in Deciduous Teeth. Samuel D. Harris. 1080
Pulp Treatment of Deciduous Teeth. Ralph O. Wagner. 1083
Rapport of Public Health Officials, Physicians and Dentists in. Kenneth R. Gibson. (Bur. Pub. Rel.) 1821
Space Maintainers, Contraindications for, in the Mouths of Children. George S. Callaway. 1091
Teeth, Are They Insurable? Charles A. Sweet. 215
Childs, Leslie. Dentists as Medical Practitioners Within "Privileged Communication" Statutes. (Legis. Com.) 133
Expert Testimony Vs. Lay Testimony in Dental Negligence Actions. (Legis. Com.) 624
Judicial Construction of Dental Liability Insurance Coverage. (Legis. Com.) 1679
Judicial Construction of What Constitutes the Practice of Dentistry. (Legis. Com.) 454
Liability of Dentist for Acts of His Employees. (Legis. Com.) 1839
Res Ipsa Loquitur as Applied to Dental Practice Accidents. (Legis. Com.) 798
Responsibility of the Dentist in the Selection and Administration of Anesthetics. (Legis. Com.) 1514

Chope, Harold D. An Administrator Cogitates His Dental Health Program. (Proc. Am. Public Health Assn., 1939.) 636
Christensen, Kermit. Sympathetic Nerve Fibers in the Alveolar Nerves and the Nerves of the Dental Pulp. (Cur. Lit.) 1525
Christiansen, George W. Technic for General Anesthesia in Surgery of the Mouth. 1575
(Christmas Seals)
Holiday Greetings. President's Page. Wilfred H. Robinson. 1967
The Spirit of Benevolence. (Editorial). 1958
Chrome-Plating Aluminum Objects in the Dental Office. G. Sidney Jacks. (Prac. in Par.) 322
Cinematography, Educational, The First International Exposition of. (Bur. Pub. Rel.) 151
Civilian Conservation Corps, Civilian Dentists Wanted for Duty with. 1859, 2019
Clapp, George Wood. The Dentist Faces His Future. (Bibliog.) 118
Clark, Henry B., Jr., and Henry B. Clark. Minimum Essentials for Tooth Removal Operations. 571
Clawson, M. Don, E. S. Khalifah and A. J. Perks. Chronic Endemic Dental Fluorosis. (Mottled Enamel). 1569
Cleft-Lip, and Cleft-Palate. William L. Shearer. 601
Congenital, Cleft Palate and Associated Nasal Deformities. Harold Stearns Vaughan. (Bibliog.) 608
or Palate, Hyperpyrexia Following Operation for. H. Irish and C. Stephen. (Cur. Lit.) 161
Cleft-Palate and Cleft-Lip. William L. Shearer. 601
and Harelip. K. B. Frazer. (Cur. Lit.) 1166
Congenital, Cleft Lip, and Associated Nasal Deformities. Harold Stearns Vaughan. (Bibliog.) 608
Partially, Double Elongations of, and Elongations of Palates with Complete Clefts. J. B. Brown. (Cur. Lit.) 992
Cleveland. (Poem) William C. Stillson. (Assn. Acts.) 802
Centennial of American Dentistry. (Editorial) 1650
Last Call for. President's Message. Arthur H. Merritt. 1494
Meeting, Highlights of. (Assn. Acts.) 1659
Meeting—September 9-13. President's Message. 1299
Cod-Liver Oil
Tuberculosis, Oral, New Treatment of. R. J. Fitzgerald and A. L. Banyai. 1647
Cohen, Joseph T. Growth and Development of the Dental Arches in Children. 1250
Cohen, Meyer. Strabismus of Dental Source. (Incs. of Prac.) 1530
Colds, Susceptibility to, Cured by Sinus Drainage After Extraction of Molar. Precioso B. Villareal. (Incs. of Prac.) 328
Coles, H. D., and Edward Shapiro. Dendritic Keratitis Caused by Abscessed Teeth. 1205
Colgate's Dental Cream, Federal Trade Commission Stipulation on, Abstract of. (Council Dent. Ther.) 1310
Collins, Leon H., Jr., and Thomas J. Cook. Oral Tuberculosis as the Initial Manifestation of Rapidly Progressing Fatal Tuberculosis. 1608
Color Perception in Dentistry. J. M. Dyce. (Cur. Lit.) 1691
Comroe, Bernard I. Rôle of the Dentist in Arthritis. 1209
Contours, and Contacts. A. Hubert Fee. 1035
Cook, Thomas J., and Leon H. Collins, Jr. Oral Tuberculosis as the Initial Manifestation of Rapidly Progressing Fatal Tuberculosis. 1608
Coolidge, Edgar D. Methods of Testing for Bacterial Growth During the Treatment of Infected Root Canals. 25
Copper-Plater, Simple, Yet Efficient, Construction of. Bernard D. Lynn. (Incs. of Prac.) 323
Council on Dental Education, a Full-Time Secretary for. (Editorial) 1295
Council on Dental Therapeutics, Annual Meeting of. 950
Counterirritant. Prescribing Suggestions. (Council Dent. Ther.) 1670
Coupland, James P. Radiodontia for the General Practitioner. 44
Cowan, Leland R. Surgical Treatment of Cancer of the Tongue. (Cur. Lit.) 992
Cox, Gerald J. The Fluorine and Dental Caries Problem. 1107
and S. F. Dixon. Preferential Mottling of the Enamel of Rat Molars. (Cur. Lit.) 487
Margaret C. Matuschak, Sara F. Dixon, Mary L. Dodds and W. E. Walker. Experimental Dental Caries. IV. Fluorine and Its Relation to Dental Caries. (Cur. Lit.) 991
Mary L. Dodds, Sara F. Dixon and Margaret C. Matuschak. Experimental Dental Caries. III. A System of Recording Corn Meal Caries in Rats. (Cur. Lit.) 824
Crawford, William H. Selection and Use of Investments, Sprues, Casting Equipment and Gold Alloys in Making Small Castings. 1459
Crowley, Mary, and Ralph F. Sommer. Bacteriologic Verification of Roentgenographic Findings in Pulp Involved Teeth. 723
Crown and Bridge Prosthesis. Stanley D. Tylman. (Bibliog.) 1814
and Inlay Casting Technics, Practical Applications of. Earl Allen Nelson. 588
Porcelain Veneer, Construction of. J. Raymond Gill. 1884
Veneer, Three-Quarter, A Modern. Charles Peterka. 1175
Cruikshank, D. B. Natural Occurrence of Zinc in the Teeth. (Cur. Lit.) 1165
Csernyei, Julius. Anachoric Effect of Chronic Periapical Inflammations. (Cur. Lit.) 651
Curtis, G. M., and K. P. Klassen. Calcium and Phosphorus Metabolism in Ossifying Fibroma of the Mandible. (Cur. Lit.) 161
Cutler, Harold J. Two-Surface Inlays for Bridge Abutments. 1260
Cyclopropane Anesthesia. R. H. Robbins. (Bibliog.) 1654
Cysts, Canal, Incisive. R. P. Gingrass. 96
Dentigerous, and Impacted Incisor. W. H. Gilbert. (Incs. of Prac.) 326
Dentigerous, Development and Etiology of. William Bauer. 904
Dentigerous, Suppurating. O. J. Shaffer. (Incs. of Prac.) 988
Infected, Attached, Incisor with. George Goldstein. (Incs. of Prac.) 1695
of the Jaws. Max H. Jacobs and Harry Stone. (Cur. Lit.) 1528

D

Dahlberg, Gunnar. Essentials of Caries Statistics and a Suggestion for a Standard. (Cur. Lit.) 2008
Dangerfield, L. F., F. W. Fox, S. F. Gottlich and E. Jokl. Vitamin C Requirements of Native Mine Laborers. (Cur. Lit.) 1690
Daniels, Wells A. Exodontia for the General Practitioner. 367
Darlington, Charles G., George W. Wilson, Howard C. Miller, Walter H. Wright and George R. Moore, 1939 Year Book of Dentistry. (Bibliog.) 440
Daro, August F. Dental Problems Arising During Pregnancy. 51
Davidson, James B., and Angus M. Brown. Management of Fractures of the Maxilla. (Cur. Lit.) 1370
Davis, DeForest. Full Denture from the Patient's Point of View. 1715
Day, C. D. Marshall. Chronic Endemic Fluorosis in Northern India. (Cur. Lit.) 1371
and G. F. Taylor. Osteomalacia and Dental Caries. (Cur. Lit.) 1850

Deafness, Infection of a Third Molar with. D. C. Woodall. (Incs. of Prac.) 1532
Deaths
Aicher, Francis J. 290
Aigley, John Emanuel. 823
Allen, Harold W. 290
Ames, Charles M. 1845
Amrine, Roscoe C. 2004
Anderson, N. C. 1163
Andrews, William H. 1364
Anthony, Robert Garfield. 164
Ashplant, Percy Roy. (Obituary) 2002
Baker, Charles R. 984
Baker, Walter S. 1345
Barker, Alton. 823
Barnaby, Walter J. 1846
Barrett, A. F. 1364
Barrett, Michael T. 2004
Bassford, A. M. 290
Beam, Augustus Pitt. 459
Bell, William Forrest. 459
Bergquist, Albert A. 984
Berry, Frederick H. 1364
Blair, Eugene K. 649
Bolzell, Charles E. 1364
Boyd, C. L. 823
Brandstater, C. Albert. 1163
Brennan, Frank Dominic. 1492
Bristor, John H. 459
Brock, A. J. 1364
Brown, E. S. 649
Bryan, Frank. 1364
Buchanan, Hugh Anthony. 1364
Buck, Minnie G. 1492
Buell, Harry S. 984
Burton, Isaac. 1163
Busby, Oscar E. 290, (Obituary) 457
Butler, C. Voyle. 1364
Buttrick, Theodore R. 649
Cabeen, Joshua D. 1846
Callender, W. B. 164
Campbell, C. F. 1492
Canada, Henry Wilkes. 649
Canfield, Milton A. 1364
Carlin, Benedict. 1846
Caswell, Daniel B. 1364
Chace, James Edward. (Obituary) 1162
Chevigny, G. A. 2004
Churchill, Guy R. 459
Clark, Grover C. 1846
Clemens, Claude C. 1492
Close, I. E. 164
Cobb, E. C. 2004
Colburn, Myron L. 1846
Cole, Charles D. (Obituary) 2001
Collins, Gerald W. 164
Colvin, Lewis Veston. 1365
Conroy, Robert R. 164
Cook, Clinton D. 459
Copley, Harry. 1846
Cormican, H. L. 823
Cress, George Tilden. 1364
Cryan, James Drennan. 290
Cunningham, Harry E. 649
Dains, Fred W. 984
Davern, John. 164
Davin, Thomas Edward. 1365
Davis, DeForest. (Obituary) 2003
Davis, Paul K. 649
Dean, Edwin Arthur. 1365
Dennison, Lee Z. 164
Despecher, Felix J. (Obituary) 1366
DeyErmand, William J. 2004
Diller, Samuel W., Jr. 984
Dodge, Charles F. 1163
Douglass, Stephen A. 2004
DuBois, Dwight W. 823
Dunn, John Thomas. 459
Eble, Max M. (Obituary) 983
Eickelberg, George C. 1365
Epley, Henry Clifford. 823
Evans, Charles C. 649
Evseroff, Jacob. 1846
Fife, Josiah Gaston. (Obituary) 1491
Fineman, Joseph J. 984
Forney, John W. 2004
Franz, Hugo. (Obituary) 458
Frazier, William N. 984
Freeman, Henry D. 1492
Frick, Edward S. 164
Gallagher, John Connell. (Obituary) 649
Gambrel, John B. 1846
Gast, August T. 459
Gaston, Edmond A. 1846
Gatterdam, J. H. 823
Gerhard, Milton U. 2004
Gibbs, S. M. 1163
Gier, Richard H. 984
Gilbert, George N. 2004
Gilbert, Gordon L. 459
Glass, A. W. 290
Goodrich, Leon H. 984
Gore, Frank A. 1365
Grant, Albert S. 1365
Griffin, Truman A. 1365
Guggenheim, Murry. (Obituary) 458
Hackett, John V. 984
Hadden, Gilbert E. 1846
Hamilton, Harry Watt. 164
Hawke, William W. 823
Henson, Douglas O. 164
Herron, John G. 1365
Higgins, William J. 984
Hill, H. H. 164
Hills, Alfred Cookman. 1492
Hinkle, T. A. 1163
Hoblitzell, Charles William. 164
Homan, Ernest W. 1492
Hopkins, Richard Simpson. 2004
Horn, Alexander Bragg. (Obituary) 1656
Horton, Phineas E. 984
Horvath, Kolman C. 459
Hovestad, Julius F. 164
Howes, R. N., Jr. 984
Hullhorst, Lewis. 2004
Hurdle, Roy V. 1846
Ioset, R. F. 164
James, Karl Young. 1492
Jarvis, Charles Fitz-Howard. 1846
Jeffrey, Frederick E. 164
Johnson, Charles P. 2004
Johnson, Paul A. 290
Johnson, T. M. 2004
Jordan, Esco E. 649
Kayser, Karl H. 823
Keach, Frederick P. 1492
Keim, Charles F. 984
King, George William. 164
Kirkland, James A. 1846
Knapp, James Franklin. 1846
Koetters, Edward F. 164
Kohn, Otto W. 1365
Krause, Otto G. (Obituary) 458
Kronfeld, Rudolf. (Obituary) 648
Lasenby, Orlo J. 1492
Laughlin, Vernon W. 290
Lawrence, Charles Ross. (Obituary) 1489
Lee, Alfred Pyle. (Obituary) 823
Lehman, William Harvey. 164
Lemley, Burton E. 823
Leseman, Philip B. 2004
Lewis, Charles B. 649
Lewis, Roscoe C. 164
Loizeaux, Jean J. 1492
Luttropp, Knut J. 164
McCarthy, Charles J. 649
McClosky, Eugene A. 984
McConalogue, Wesley. 1846
McCormick, Henry G. 1846
McCrae, H. C. 2004
McDonald, A. J. 1492
McKibbin, George Paul. 984
McLemore, W. Y. 2004
McManus, Charles. (Obituary) 822
McPhail, John A. 649
McPhee, John. 823
McSwiggin, J. F. 290
Mahood, D. G. 1365
Marcin, Andrew J. 2004
Marcinkiewicz, Charles J. 1365
Marino, Joseph. 2004
Marshall, C. R. 1492
Martin, James F. 1492
Martin, Lewis Allan. 2004
Mayes, Theodore W. (Obituary) 163
Melaik, Naseef. 290
Milbourn, Reason E. 984
Miller, Dennis S. 290
Miller Robert M. 1492
Mitchell, Willard T. 1365
Moeller, Frederick M. 1492
Moss, J. M. 1163
Motelet, Joseph P. 2004
Mulford, Warren E. 1163

Munster, John H. 290
Murphy, F. J. 459
Nance, C. L. 1365
Nathan, Charles. 1846
Nick, Walter E. 649
Norton, Ira P. 1846
Nowacki, Stanley J. 1492
O'Connor, Eugene L. 823
Ohl, L. Wallace. (Obituary) 1656
O'Neill, Emmet, Jr. 1365
Paiste, James L. 823
Parker, Allison J. 1846
Paul, Joseph T. 1492
Peer, Homer. 1846
Perry, James J. 649
Peterson, G. A. 1492
Peterson, Willard B. 649
Phillips, George P. 290
Ransier, Wayne A. 1492
Rathbun, Charles N. 1365
Reavis, J. J. 2004
Reed, John Howard. (Obituary) 983
Reese, D. J. 1365
Richardson, Walter H. 1492
Roberts, Edward O. 2004
Roberts, Norman J. (Obituary) 1845
Rockey, Waverley J. 1365
Rodolf, C. F. 290
Rosenblum, Joseph. 290
Sage, Albert O. 1846
Saltsman, F. B. 459
Sample, Willard S. 290
Sanberg, Frank E. 1492
Sauer, Clarence J. 2004
Saunders, Charles H. 1846
Schedine, H. E. 1365
Schindler, John G. 2004
Schoverling, Clifford S. 1846
Seip, Howard Shimer. (Obituary) 457
Sengpiel, John V. 2004
Sharpless, William H. 290
Shields, Nelson T. 1846
Shoop, Victor. 1365
Siefkin, Charles W. 1365
Simmons, Winfield Scott. 459
Small, Berton A. 649
Smeltzer, Warren H. 2004
Smith, O. H. 290
Smith, Ray R. 459
Snyder, A. M. 1846
Souders, Guy Emerson. 1365
Sowler, Alexander M. 459
Spessard, Edward W. 2004
Stilley, Van Albert, Jr. 290
Stout, Roscoe L. 459
Stowell, C. F. B. (Obituary) 163
Sturgeon, Dwight Paul. 290
Stutts, Eugene Phillips. 1365
Sulkers, Chester F. 1365
Swain, Stephen R. 2004
Swartz, Frederick H. 1846
Taliant, George C. 1365
Thewalt, Myra L. 2004
Thornberry, A. E. 459
Tocci, Albert Mark. 823
Triplett, William Thomas. 649
Trussell, C. W. 290
Van Gieson, Ransford B. 459
Vickers, Harvey H. 2004
Von Berg, George W. 1365
Wadsworth, Henry P. 290
Walton, Charles A. 1365
Weatherwax, Walter J. 1846
Webb, George W. 290
West, G. Edgar. (Obituary) 822
Westfall, Mary H. 1492, (Obituary) 1655
Westwood, Charles E. 1365
Wheeler, George. (Obituary) 1366
Wielage, M. Francis. 290
Wiggins, Hundley. 290
Wildason, Frank A. 459
Wilhelm, Samuel E. 2004
Wilke, Herbert F. 2004
Williams, George R. E. 290
Williams, J. H. 164
Williams, Justus Wright. 459
Winter, George B. (Obituary) 820
Wold, Earl N. 1365
Wood, Lewis E. 1365
Work, Craig M. 1365
Wren, Edwin S. 823
Yeager, William N. 290
Zehrung, Harry M. 1492

Degering, E. F., W. A. Bittenbender, P. A. Tetrault, C. F. Feasley and B. H. Gwynn. Bactericidal Properties of Commercial Antiseptics. (Cur. Lit.) 1528

De La Borbolla, D. F. Rubin. Types of Tooth Mutilation Found in Mexico. (Cur. Lit.) 1167

Delegates' Expenses, Payment of, by State Dental Societies. (Assn. Acts.) 1324

Dement, Robert L. Flap Operation and Its Place in the Treatment of Periodontal Lesions. 1761

Dental Abnormalities in Recruits. Walter Rehrauer and Karl Van Lear Bergland. (Cur. Lit.) 1165
Health Capacity: Its Evaluation and Prediction. Arthur L. Jensen. 1003
Health. Oral Conditions of Children in Relation to State of General Health and Habits of Life. Reidar F. Sognnaes and Ruth L. White. (Cur. Lit.) 1689
Literature. O. W. Brandhorst. 267

Dental Materials, Certified, Lists of. (Res. Com.) 791
Denture Rubber: Composition, Properties and Specification. W. T. Sweeney and H. J. Caul. 1446
Midyear Report of the Research Commission of the American Dental Association. (Assn. Acts.) 620
Science of. Eugene W. Skinner. (Bibliog.) 1815
Stiffness Characteristics and Bending Tests as Applied to. John S. Shell. 232
Wrought Metal for Technic Use. George S. Easton. (Cur. Lit.) 1851

Dental Preparedness, Committee on, American Dental Association, 1818, 1970
Military Affairs Committees, State, Chairmen. (Assn. Acts.) 1819

Dentifrices. (Council Dent. Ther.) 283, 448, 790, 1139, 1312, 1513, 1671, 1989
Brundage Tooth Paste. (Council Dent. Ther.) 1312
Calox Tooth Powder, Federal Trade Commission Order on. (Abstr.) (Council Dent. Ther.) 448
Carley's Tooth Powder. (Council Dent. Ther.) 283
Colgate's Dental Cream, Federal Trade Commission Stipulation on, Abstract of. (Council Dent. Ther.) 1310
Dr. Lyon's Tooth Powder—Not Acceptable for A.D.R. (Council Dent. Ther.) 1133
Gold's Tooth Paste. (Council Dent. Ther.) 1513
Hopkins Tooth Powder. (Council Dent. Ther.) 1513
Krest Tooth Paste. (Council Dent. Ther.) 1139
Lavco Tooth Paste. (Council Dent. Ther.) 1989
Liquid Dentifrice. Prescribing Suggestions. (Council Dent. Ther.) 957
Mabley's Dental Cream. (Council Dent. Ther.) 1513
Orrin's Tooth Powder. (Council Dent. Ther.) 283
Pogue's Tooth Powder. (Council Dent. Ther.) 283
Potassium-Sodium Carbonate Mixture (Bisbee) (Council Dent. Ther.) 1513
Taylor-Rea Tooth Paste. (Council Dent. Ther.) 1989
Taylor's Tooth Powder. (Council Dent. Ther.) 1513
Tooth Powder. Prescribing Suggestions. (Council Dent. Ther.) 957
Vandever's Tooth Paste. (Council Dent. Ther.) 790

Dentigerous Cyst, and Impacted Incisor. W. H. Gilbert. (Incs. of Prac.) 326
Development and Etiology of. William Bauer. 904
Suppurating. O. J. Shaffer. (Incs. of Prac.) 988

Dentin, and Enamel, Effect of Fluorine on Solubility of. Joseph Volker. (Cur. Lit.) 993
and Enamel, Exchange of Phosphates by,

in Vitro Experiments on. W. D. Armstrong. (Cur. Lit.) 1526
Bacteriologic Status of, After Cavity Preparation. Samuel Seltzer. 1799
Carious and Non-Carious, pH of. Louis I. Grossman. (Cur. Lit.) 1168
Human, Normal, Light Scattering in. R. S. Manly, J. F. Bonner and H. C. Hodge. (Cur. Lit.) 1526
Hypersensitive. Prescribing Suggestions. (Council Dent. Ther.) 447
in Dogs, Effect of Application of Vitamin D to. P. S. Failla and C. I. Reed. (Cur. Lit.) 1852
Leukocytes, Migration of, into the Dentinal Tubules. Balint Orban. 239
Observations on Fish's "Dead Tract" in. M. A. Rushton. (Cur. Lit.) 1371
Opalescent, Evidence of the Heredity Factor in. Don C. Lyons. 1281
Dentist Faces His Future. George Wood Clapp. (Bibliog.) 118
Dentistry, American, Centennial of. Arthur H. Merritt. (President's Address) 1794
American, Cleveland Centennial of. (Editorial) 1650
American, Progress of. Arthur H. Merritt. 1103
and the National Health Program. Harold W. Oppice. 33
and the Scout Movement. (Assn. Acts.) 143
Dentist, Dental Technician and Public. Walter H. Wright. 1932
Digest of Practice. (Bibliog.) 1964
for the Mentally Ill Patient. Ralph F. Huber. (Bur. Pub. Rel.) 1129
in the Netherlands East Indies. (Bur. Pub. Rel.) 291
Practice of, Judicial Construction of What Constitutes. Leslie Childs. (Legis. Com.) 454
Story of. M. D. K. Bremner. (Bibliog.) 773
Year Book of 1939. Charles G. Darlington, George W. Wilson, Howard C. Miller, Walter H. Wright, and George R. Moore. (Bibliog.) 440
Dentistry in the Army and Navy
Cleveland Meeting, Highlights of. (Assn. Acts.) 1659
Dental Officer, Transition of a Civilian Dentist to. R. W. Force. (Cur. Lit.) 1691
Dental Preparedness, Committee on. (Assn. Acts.) 1658, 1818, 1970
Dental Surgeon with Combat Troops. J. H. Jaffer. (Cur. Lit.) 1693
Dentistry Moves Onward. Leigh C. Fairbank. 927
Gunshot Wounds of the Face and Jaws; First Aid Treatment, Field Service. R. A. Stout. (Cur. Lit.) 1690
in Mobilization. Leigh C. Fairbank. (Assn. Acts.) 1972
Mobilization of the Dental Profession. Questions and Answers. (Assn. Acts.) 1975
Recruit Selection. Robert A. Bell. (Cur. Lit.) 1852
Recruits, Dental Abnormalities in. Walter Rehrauer and Karl Van Lear Berglund. (Cur. Lit.) 1165
Dentition—A Third Set of Teeth? George B. Winter. 110
Deciduous, Relationship of, to the Normal Growth and Development of the Jaws. Kenneth Adamson. (Cur. Lit.) 2009
Denture Adhesive. Prescribing Suggestions. (Council Dent. Ther.) 787
Cleaner. Prescribing Suggestions. (Council Dent. Ther.) 787
Dentures (See also Prosthesis)
Biting Power, Intermaxillary Relation Established by. Ralph H. Boos. 1192
Complete. Merrill G. Swenson. (Bibliog.) 1964
Diagnosis, Prognosis and Records Preliminary to the Construction of. O. M. Dresen. 1911
Displacement of Tissues Under, Studies of. Carl O. Boucher. 1476
False Ideas About False Teeth. LeRoy Kurth. (Cur. Lit.) 2008
Full, Centric and Eccentric Occlusion in, with the Mandibulograph. Thomas E. J. Shanahan. 708
Full, Construction, Posterior Occlusal Plane in. L. E. Kurth. 85
Full, from the Patient's Point of View. DeForest Davis. 1715
Full, Prosthesis, Tradition and Its Effect on Progress in. Russell W. Tench. 762
Immediate Denture Technic for the General Practitioner, Complete. William W. Hurst. 1903
Impressions, Correct, Method of Securing. Walter H. Wright. 1584
Impressions, Full Denture, Lower, Pouring. F. D. Steckman. (Prac. in Par.) 321
Mandibular Position and the Partial Denture. Charles H. Jamieson. 3
Partial, Construction, Modern, Use of Paralleling Surveyor in. Oliver C. Applegate. 1397
Partial, Method That Simplifies the Design of. F. C. Elliott. 1263
Partial, System of Functional Restoration. Ferdinand G. Neurohr. (Bibliog.) 118
Partial, Warped, Simple Method of Restoring Relationship in. Howard C. Sigtenhorst. (Incs. of Prac.) 488
Plates, Partial, Aid in Deflasking, When Acrylic Resins Are Used. F. D. Steckman. (Prac. in Par.) 321
Prosthesis, Complete, Study in Ethics and Economics Pertaining to the Field of. Rudolph O. Schlosser. 1222
Prosthetic, Reaction of Human Jaws to. Elbert Crosby Pendleton. 667
Technic, Functional Denture. George P. Brenner. 1873
Rubber: Composition, Properties and a Specification. W. T. Sweeney and H. J. Caul. 1446
Weight, Loss of, Unfamiliar Cause of. William A. Pusey. (Cur. Lit.) 1166
Dermatitis, Occupational, in Dentistry. J. H. Dickey. (Corres.) 322
Quinine, from Anacin. J. Lamb. (Cur. Lit.) 482
DeWolf, R. J. Use of Sulfanilamide and Guaiacol Glycerine Solution. (Incs. of Prac.) 324
Diabetes Mellitus, Dental Cooperation in. S. Blaustein and C. Ferguson. (Cur. Lit.) 484
Periodontal Symptoms Associated with. Isador Hirschfeld. (Cur. Lit.) 161
Diabetics, Juvenile, Oral and Roentgenographic Aspects of the Teeth and Jaws of. C. E. Rutledge. 1740
Diagnosis, Oral, Radiodontic Aspect of. D. W. Lovett. 421
Examination, Clinical, Detailed, of Carious Lesions, Importance of. Reidar F. Sognnaes. (Cur. Lit.) 993
Roentgenographic. Milton B. Asbell. (Incs. of Prac.) 1530
Diamond, Moses, and Joseph P. Weinmann. The Enamel of Human Teeth. (Bibliog.) 1297
(Diathermy, Devitalization of the Vital Pulp with). S. S. Lindholm. (Cur. Lit.) 1849
Dickey, J. H. Occupational Dermatitis in Dentistry. (Correspondence.) 322
Dictionary, Medical, Stedman's. Thomas Lathrop Stedman. (Bibliog.) 275
Diet
An Unsweetened Tooth Cannot Decay! L. M. Waugh. (Bur. Pub. Rel.) 1124
Cereal and Non-Cereal, Comparison of, in the Production of Rickets. J. Jones. (Cur. Lit.) 160
Deficiencies, Dietary, Various Experimental, Oral Pathology (Pathosis) in Monkeys in. T. H. Tomlinson, Jr. (Cur. Lit.) 158
Dietary Effects upon the Acid Neutralizing Power of the Saliva. J. H. Wills and J. C. Forbes. (Cur. Lit.) 486
Dietary Supplement, Reduction of Dental Caries by. Mark D. Elliott and Dorothea Nicoll. (Proc. Am. Public Health Assn., 1939.) 639
Dietetics Simplified. L. Jean Bogert. (Bibliog.) 1965

Food, Nutrition and Health. E. V. McCollum. (Bibliog.) 1965
Oxalic Acid in Foods and Its Behavior and Fate in the. E. Kohman. (Cur. Lit.) 482
Rôle of, in the Control of Dentinal Caries. Julian D. Loyd. 750
Stomatitis of Dietary Origin. W. R. Aykroyd, B. G. Krishnan and R. Passmore. (Cur. Lit.) 485
Study of Local Oral Effect of, on the Periodontal Tissues and the Gingival Capillary Structure. Rudolph H. Pelzer. 13
Values, Food, of Portions Commonly Used. Anna De Planter Bowes. (Bibliog.) 774
Vitamin C. Requirements of Native Mine Laborers. F. W. Fox, L. F. Dangerfield, S. F. Gottlich and E. Jokl. (Cur. Lit.) 1690
Dillon, Charles. Bacteriology of Trench Mouth and Its Treatment. (Cur. Lit.) 1850
Disclosing Solution. Prescribing Suggestions. (Council Dent. Ther.) 1831
Disinfectants and Cavity Rinses. Prescribing Suggestions. (Council Dent. Ther.) 1136
Disinfecting Fluid. Prescribing Suggestions. (Council Dent. Ther.) 1513
District of Columbia Dental Law, New. (Editorial) 1291
Dittmar, G. Walter, To Be Honored. (Assn. Acts.) 2000
Dixon, Sara F., and Gerald J. Cox. Preferential Mottling of the Enamel of Rat Molars. (Cur. Lit.) 487
Gerald J. Cox, Mary L. Dodds and Margaret C. Matuschak. Experimental Dental Caries. III. A System of Recording Corn Meal Caries in Rats. (Cur. Lit.) 824
Gerald J. Cox, Margaret C. Matuschak, Mary L. Dodds and W. E. Walker. Experimental Dental Caries. IV. Fluorine and Its Relation to Dental Caries. (Cur. Lit.) 991
Dobell's Solution. Prescribing Suggestions. (Council Dent. Ther.) 958
Dodds, Mary L., Gerald J. Cox, Margaret C. Matuschak, Sara F. Dixon and W. E. Walker. Experimental Dental Caries. IV. Fluorine and Its Relation to Dental Caries. (Cur. Lit.) 991
Gerald J. Cox, Sara F. Dixon and Margaret C. Matuschak. Experimental Dental Caries. III. A System of Recording Corn Meal Caries in Rats. (Cur. Lit.) 824
Doherty, Joseph A. Fractures of the Mandible. A Statistical Study of One Hundred Cases. 735
Dresen, O. M. Diagnosis, Prognosis and Records Preliminary to the Construction of Dentures. 1911
Drewett, T. E., W. N. Brashears and W. G. Edmonds. Improving the Mastication Efficiency and Facial Esthetics in a Case of Gross Prognathism of the Upper Jaw by Means of Oral Surgery. (Cur. Lit.) 1372
Drugs in Periodontal Therapy. Harry Lyons. 879
Dry Socket, Treatment of: A Preliminary Report. William E. Shea. 1482
Durham, K. R. Fractured Central Incisor. (Incs. of Prac.) 987
Dwyer, H. Shirley. Does Experience Justify Prophylactic Odontotomy? 1092
Dyce, J. M. Color Perception in Dentistry. (Cur. Lit.) 1691

E

Easlick, Kenneth A. Pulp Management: A Summary. 1097
East, Bion R., and Hilda Kaiser. Association of Dental Caries in Children with Sex, Age and Environment. 1430
Easton, George S. Wrought Metal for Technic Use. (Cur. Lit.) 1851
Eckhardt, Jane, Ethel L. French, Helen Tefft, Margaret Rathbun, Eileen Welch and Harold C. Hodge. Composition of Precolumbian Teeth. (Cur. Lit.) 826
Eckstein, Albert. Noma. (Cur. Lit.) 994
Economics and Ethics, Study in, Pertaining to the Field of Complete Denture Prosthesis. Rudolph O. Schlosser. 1222
Dental Conditions, Do Dental Health Programs Improve? J. F. Owen (Econ.) 1681
Dental Need, Adult, Preliminary Study of. R. M. Walls. (Econ.) 806
Dental Needs of Adults, Survey of. (Econ.) 1148
Dental Needs of Grade School Children of Hagerstown, Md. John W. Knutson, Henry Klein and Carroll E. Palmer. 679
Dental Postpayment Plans and the Plan in Manchester, N. H. (Econ.) 1149
Dentist Faces His Future. George Wood Clapp. (Bibliog.) 118
Dentistry and the National Health Program. Harold W. Oppice. 33
Dentistry's Social Responsibilities: How Are They to Be Met? President's Message. Arthur H. Merritt. 618
Hospital Service Plans, Non-Profit. (Econ.) 647
Hygiene, Mouth, Programs for School Children, A Survey of. (Econ.) 152
Insurance of Children Against Caries. Henry C. Sandler. (Bur. Pub. Rel.) 460
Medical Care, Summary of the American Medical Association's Study on. (Econ.) 476
Medical Care (Symposium), Law and Contemporary Problems. (Bibliog.) 938
Missouri Plan. Paul F. O'Brien. (Econ.) 1317
National Health Program Committee. (Assn. Acts.) 124
Survey of Adult Dental Needs. (Econ.) 648
Survey of Greater Cleveland and Northeastern Ohio. Chester J. Schultz. (Econ.) 973
Teeth, Are They Insurable? Charles A. Sweet. 215
Wagner Health Bill. (Editorial) 273
White House Conference on Children in a Democracy. (Assn. Acts.) 289
Wisconsin's Voluntary Sickness Insurance Experiments. (Econ.) 478
Editor, Dental, Qualifications and Duties of. American Association of Dental Editors. (Assn. Acts.) 1523
Editorials
Alumni, Dental, Society, Your. 1961
Anesthesia, Discovery of. 438
Baltimore, On to. 435
Benevolence, The Spirit of. 1958
Caries, Dental, Etiology of, Search for. 113
Centenary Celebration. 604
Chicago Midwinter Meeting. 437
Cleveland Centennial of American Dentistry. 1650
Council on Dental Education, Full-Time Secretary for. 1295
Dental Preparedness. 1810
Education, Dental, and Licensure, Congress on. 1963
Education, Dental, and Licensure. 1963
Fluorosis, Endemic, and Dental Caries. 1115
Greater New York Dental Meeting. 115
Harvard Dental Educational Plan, The New. 1483
Internship as a Prerequisite for Dental Licensure. 933
Law, Dental, District of Columbia, New. 1291
National Board of Dental Examiners. 1806
Prevention, Practical Application of the Principles of. 270
Pulp Involved Tooth, Why Not Save? 769
Wagner Health Bill. 273
Edmonds, W. G., W. N. Brashears and T. E. Drewett. Improving the Mastication Efficiency and Facial Esthetics in a Case of Gross Prognathism of the Upper Jaw by Means of Oral Surgery. (Cur. Lit.) 1372

Education
Dental, and Licensure, Congress on. (Assn. Acts.) 1843
Dental, Council on. (Assn. Acts.) 1841
Dental. Including a Study of the Alleged Influence of Derogatory Medical Opinion on Its Institutional Initiation in 1840. William J. Gies. 99, 397
Dental, Problems in. Lloyd E. Blauch. 219
Dental, and Licensure, Congress on. (Editorial). 1963; (Assn. Acts.) 1991
Harvard, Dental Educational Plan, New. (Editorial) 1843
Harvard School, New, of Dental Medicine. (Assn. Acts.) 1156
Kellogg, W. K., Foundation Institute for Graduate and Post-Graduate Dentistry, Dedication of. (Assn. Acts.) 451, 817
Lectures, Dental, in Montana Nursing Training Schools. (Assn. Acts.) 143
Postgraduate Dentistry. (Assn. Acts.) 133
Public Health, Massachusetts Institute of Technology Offers Summer Courses in. (Bur. Pub. Rel.) 295
Refresher Courses in Dental Diagnosis and Periodontia. (Assn. Acts.) 132
Research, Dental, Laboratory Facilities for, in Basic Sciences at the University of Minnesota. Peter J. Brekhus. 358
Research in Dentistry; Its Importance in Dental Education. Hamilton B. G. Robinson. 918

Education, Public Health
Cinematography, Educational, First International Exposition of. (Bur. Pub. Rel.) 151
Clinic, Dental, School, of the Palo Alto (California) Public Schools. Annual Report 1938-1939. (Bur. Pub. Rel.) 144
Dentistry, Shall We Sell It Short? Leon R. Kramer. (Proc. Am. Public Health Assn., 1939.) 640
Education Dental Health Needs. Lon W. Morrey. 1623
Education, Dental, in the Public Interest. William J. Gies. 851
Education to Improve Dental Conditions. J. M. Wisan. (Proc. Am. Public Health Assn., 1939.) 634
Educational Program, Health, State-Wide, Conducting. Richard C. Leonard. (Bur. Pub. Rel.) 1663
Eighth American Scientific Congress, Department of State, Washington, D. C. (Assn. Acts.) 818
Frontiers in. Florence B. Hopkins and Jean V. Latimer. (Proc. Am. Public Health Assn., 1939.) 641
Radio Manual: Compilation of Radio Broadcasts for Mouth Health Education. Oral Hygiene Committee of Greater New York. (Bibliog.) 441
School Dental Program, How Community Dentists Can Participate in. S. S. Lifson. (Proc. Am. Public Health Assn., 1939.) 634
School, Problems Confronting. Hiram A. Jones. (Bur. Pub. Rel.) 1665
Teeth, Health and Appearance. (Bibliog.) 1119
Three to Six Appeal. W. J. Pelton. (Bur. Pub. Rel.) 1496

Educational Material
Molds, Rubber, of Famous Funnies, Famous Americans, National Types and Animals. (Bur. Pub. Rel.) 646
Pinocchio and Jiminy Cricket Rubber Molds. (Bur. Pub. Rel.) 949
Pinocchio Good Teeth Buttons and Certificates. (Bur. Pub Rel.) 475
Santa Claus Molds. (Bur. Pub. Rel.) 1669, 1985
Three to Six Appeal. W. J. Pelton. (Bur. Pub. Rel.) 1496

Edwards, Ralph W. Dental Uses of Sulfanilamide. 1394

Electrocautery. Meyer, M. Silverman. (Prac. in Par.) 1533

Electrogalvanism, Problem of, in the Oral Cavity Caused by Dissimilar Dental Metals. Everett S. Lain, William Schriever and G. Sherrill Caughron. 1765

Electrosterilization, Bacteriologic Evaluation of. Harry Zelson. 1896

Elliott, F. C. A Method That Simplifies the Design of Partial Dentures. 1263

Elliott, Mark D., and Dorothea Nicoll. Reduction of Dental Caries by Dietary Supplement. (Proc. Am. Public Health Assn., 1939.) 639

Elliott, S. L. Impacted and Supernumerary Teeth with Cyst: Report of a Case. (Incs. of Prac.) 987

Ellsperman, George A. Refinement of the Gold Foil Restoration. 342

Enamel and Caries, Radiopaque Surface Layer of. Edmund Applebaum. (Cur. Lit.) 826
and Dentin, Effect of Fluorine on Solubility of. Joseph Volker. (Cur. Lit.) 993
and Dentin, Exchange of Phosphates by, In Vitro Experiments on. W. D. Armstrong. (Cur. Lit.) 1526
Dental, Submicroscopic Structure of. J. Thewlis. (Cur. Lit.) 654
Histologic and Other Researches, Recent, Critical Review of. A. W. Wellings. (Cur. Lit.) 1688
Human, Acid Solubility of, Studies on. Joseph Volker. (Cur. Lit.) 828
Human, New Findings in the Histology and Pathology of. Joseph D. Berke. 1229
of Human Teeth. Moses Diamond and Joseph P. Weinmann. (Bibliog.) 1297
Spindles, Etiology of, in Human Teeth. Carl August Schlack. (Cur. Lit.) 1527
Tooth, Solubility of, in Saliva at Various pH Levels. (Cur. Lit.) 162

Englander, J. A. Bone Regeneration Following Conservative Root Canal Treatment. 1733

Ennis, LeRoy M. Dental Roentgenology. (Bibliog.) 442

Ensor, C., J. Haldi, G. Bachmann and W. Wynn. Effect of High Calcium and Phosphorus Intake on the Calcium and Phosphorus Balance. (Cur. Lit.) 483

Epanutin and the Gums. (Cur. Lit.) 317

Epithelium Solvent. Prescribing Suggestions. (Council Dent. Ther.) 1831

Epithelization
Scarlet Red Ointment. Prescribing Suggestions. (Council Dent. Ther.) 1670

Erich, John B., and Gordon B. New. Retruded Chins: Correction by Plastic Operation. (Cur. Lit.) 1528

Eselman, J. C. Internal Resorption: Report of a Case. (Incs. of Prac.) 657

Eskimos, Primitive, Effects of Natural and Refined Sugars on Oral Lactobacilli and Caries Among. Donald B. Waugh and Leuman M. Waugh. (Cur. Lit.) 991

Esthetics
Bridge, Fixed, Restorations, Some Important Aspects of. Arthur O. Klaffenbach. 738
Color Perception in Dentistry. J. M. Dyce. (Cur. Lit.) 1691

Ethics and Economics, Study in, Pertaining to the Field of Complete Denture Prosthesis. Rudolph O. Schlosser. 1222
the Soul of Dentistry. (V) J. Wright Beach. 1289

Ethyl Chloride and Vinyl Ether, Comparison of, in a Series of 200 Cases. Dental Anesthesia in Children. J. O. French, M. L. Hooker, R. B. Vanse and A. L. Robinson. (Cur. Lit.) 992

Evans, Clifford. Fatal Case of Monocytic Leukemia with Ulceration and Sloughing of the Soft Palate. (Cur. Lit.) 1689

Exhibits, Commercial, at Dental Centenary Celebration. 311
Milwaukee Meetings, Scientific and Health Exhibits at. (Bur. Pub. Rel.) 294

Exodontia
and Oral Surgery, Intravenous Anesthesia in Office Practice for Operations in: Based on Experience of 946 Cases. Oran K. Bullard. (Cur. Lit.) 827
Bacteremia, Streptococcus Viridans, Following Extraction of Teeth. H. D. Palmer and Myrna Kempf. (Cur. Lit.) 654
(Extraction of the First Permanent Molar

During Childhood.) Guttorm Toverud. (Cur. Lit.) 993
for the General Practitioner. Wells A. Daniels. 367
Molars, Third, Superior, Extraction of, Precautionary Measures in. G. Sidney Jacks. (Prac. in Par.) 157
Textbook of. Leo Winter. (Bibliog.) 1654
Tooth Removal Operations, Minimum Essentials for. Henry B. Clark, Jr., and Henry B. Clark. 571
Eyesight, Improvement in, After Extraction of Impacted Bicuspid. Precioso B. Villareal. (Incs. of Prac.) 324
Eyestrain, Less, Better Oral Visual Clarity with. Sigmund F. Faye. (Prac. in Par.) 985

F

Faillo, P. S., and C. I. Reed. Effect of Application of Vitamin D to Dentin in Dogs. (Cur. Lit.) 1852
Fainting, Stimulant in. Prescribing Suggestions. (Council Dent. Ther.) 1832
Fairbank, Leigh C. Dentistry in Mobilization. (Assn. Acts.) 1972
Dentistry Moves Onward, 927
Faye, Sigmund F. Better Oral Visual Clarity with Less Eyestrain. (Prac. in Par.) 985
Fears, Childhood, Toward Dentistry, How to Control. George E. Morgan. 766
Feasley, C. F., W. A. Bittenbender, E. F. Degering, P. A. Tetrault and B. H. Gwynn. Bactericidal Properties of Commercial Antiseptics. (Cur. Lit.) 1528
Federal Food, Drug and Cosmetic Act, Abstracts of Notices of Judgment Under. (Council Dent. Ther.) 1137
Federal Laws on Foods, Drugs, Devices and Cosmetics. Samuel R. Lewis and Harold L. Hansen. 80
Federal Trade Commission Order on Al Viola Dental Plate Tightener and Reliner. (Council Dent. Ther.) 1310
Order on Calox Tooth Powder (Abstract) (Council Dent. Ther.) 448
Stipulation on Acquin. (Council Dent. Ther.) 789
Stipulation on Ce-Kelp. (Council Dent. Ther.) 788
Stipulation on Colgate's Dental Cream, Abstract of. (Council Dent. Ther.) 1310
Stipulation on Fleer's Dubble Bubble Chewing Gum. (Council Dent. Ther.) 1988
Stipulation on Vitamins Plus. (Council Dent. Ther.) 1989
Stipulation on Zonite Products, Abstract of. (Council Dent. Ther.) 789
Fee, A. Hubert. Contacts and Contours. 1035
Fees
Prosthesis, Full Denture, Tradition and Its Effect on Progress in. Russell W. Tench. 762
Ferguson, C., and S. Blaustein. Dental Cooperation in Diabetes Mellitus. (Cur. Lit.) 484
Fevers, Effect of, on the Development of the Rat Incisors. Leland H. Garrison. (Cur. Lit.) 1527
Induced, Artificially, Effect of, on the Structure of the Developing Teeth of the Rat. J. Bevelander and F. G. Bernstein. (Cur. Lit.) 1168
Fibroma, Ossifying, of the Mandible, Calcium and Phosphorus Metabolism in. K. P. Klassen and G. M. Curtis. (Cur. Lit.) 161
Fickling, B., Paul Pincus and B. Boyd-Cooper. M & B 693 in the Saliva. (Cur. Lit.) 653
Field, Henry, Jr. Therapy of Fusospirochetosis. (Cur. Lit.) 1166
Finn, Sidney B., and Harold C. Hodge. Reduction of Experimental Rat Caries by Fluorine. (Cur. Lit.) 160
and K. Morgareidge. Effect of Fluorine on the Activity of Vitamin D in Rachitic Rats. (Cur. Lit.) 1693
Finnish Lapps, Dental Hypoplasia and Caries Among the Children of. Helen Mellanby. (Cur. Lit.) 1372
Fischer, S. J. Simple Technic for Obtaining Better Gingival Margins by the Direct Inlay Method in Compound Cavities of Molars and Bicuspids. (Prac. in Par.) 157
Fishman, Louis Z., and Francis L. Lederer. Phlegmons, Including Fascial Sheath Infections, of the Face and Neck of Dental Origin. 1439
Fistula, Parotid, Bilateral, Roentgen Therapy of. Robert J. Reeves. (Cur. Lit.) 993
Fitzgerald, R. J., and A. L. Banyai. New Treatment of Oral Tuberculosis. 1647
Five State Post Graduate Clinics. (Assn. Acts.) 816, 2015
Flap Operation and Its Place in the Treatment of Periodontal Lesions. Robert L. Dement. 1761
Fleisch, Louis M. "Has It Been Proved That Sugar Is A Significant Factor in Dental Caries." (Corres.) 2006
Relation of Nutrition to Dental Caries; A Review of Recent Findings. 550
Fleming, A. Effect of Antiseptics on Wounds. (Cur. Lit.) 1527
Floody, R. T., and A. Knudson. Fat as a Factor in the Healing of Rickets. A. Knudson and R. T. Floody. (Cur. Lit.) 2011
Fluorides, Adsorption of, by Enamel, Dentin, Bone and Hydroxyapatite as Shown by the Radioactive Isotopes. J. F. Volker, H. C. Hodge, H. J. Wilson and S. N. VanVoorhis. (Cur. Lit.) 1691
Effect of, on Salivary Amylase. F. McClure. (Cur. Lit.) 485
in Drinking Water and Dental Caries. C. A. Mills. (Cur. Lit.) 825
Sodium, in a Dry Diet in Milk and in Water, A Study of the Relative Toxicity of. Cecilia Schuck. (Cur. Lit.) 651
Fluorine and Dental Caries Problem. Gerald J. Cox. 1107
and Its Relation to Dental Caries. IV. Experimental Dental Caries. Gerald J. Cox, Margaret C. Matuschak, Sara F. Dixon, Mary L. Dodds and W. E. Walker. (Cur. Lit.) 991
Effect of, on Mouth Bacteria. B. G. Bibby and M. VanKesteren. (Cur. Lit.) 1851
Effect of, on Solubility of Enamel and Dentin. Joseph Volker. (Cur. Lit.) 993
in the Diet, Adaption of Growing Rat to the Ingestion of a Constant Concentration of. Margaret Lawrenz, H. H. Mitchell and W. A. Ruth. (Cur. Lit.) 1372
Effect of, on the Activity of Vitamin D in Rachitic Rats. S. B. Finn and K. Morgareidge. (Cur. Lit.) 1693
Inhibition of Experimental Dental Caries by, in the Absence of Saliva. Virgil D. Cheyne. (Cur. Lit.) 824
Intoxication, Chronic, in Domestic Animals. A. Pierce. (Cur. Lit.) 162
Reduction of Experimental Rat Caries by. Harold C. Hodge and Sidney B. Finn. (Cur. Lit.) 160
Fluorosis (See also Mottled Enamel)
Dental, Chronic Endemic (Mottled Enamel). M. Don Clawson, E. S. Khalifah and A. J. Perks. 1569
Endemic, and Dental Caries. (Editorial) 1115
Endemic, Chronic, in Northern India. C. D. Marshall Day. (Cur. Lit.) 1371
Focal Infection and Systemic Disease: A Critical Appraisal. H. A. Reimann and W. P. Havens. (Cur. Lit.) 825
Foci of Infection, Oral, as Related to Diseases of the Kidney. C. Canby. (Cur. Lit.) 483
Gastro-Intestinal Diseases and Their Relation to. William E. Bippus. (Cur. Lit.) 2009
Foley, Genevieve, Theodor Rosebury and F. Rights. Effects of Neoarsphenamine and Sulpharsphenamine on Experimental Fusospirochetal Infection in Guinea Pigs. (Cur. Lit.) 816
Fomon, Samuel. Surgery of Injury and Plastic Repair. (Bibliog.) 440

Fonda, Lyman D. The Era-Key to U. S. P. XI and N. F. VI. (Bibliog.) 1814
Food, Nutrition and Health. E. V. McCollum. (Bibliog.) 1965
Values of Portions Commonly Used. Anna De Planter Bowes. (Bibliog.) 774
Foods, Drugs, Devices and Cosmetics, Federal Laws on. Samuel R. Lewis and Harold L. Hansen. 86
Forbes, J. C., and J. H. Wills. Dietary Effects upon the Acid Neutralizing Power of the Saliva. (Cur. Lit.) 486
Force, R. W. Transition of a Civilian Dentist to a Dental Officer. (Cur. Lit.) 1691
Ford, James W. The Unerupted Third Molar from an Orthodontic Point of View. 1863
Ford, Leo M. Oral Surgery Complications from a Medico-Legal Viewpoint. (Econ.) 1992
Fosdick, L. S., and A. C. Starke, Jr. Solubility of Tooth Enamel in Saliva at Various pH Levels. (Cur. Lit.) 162
and G. D. Wessinger, Carbohydrate Degradation by Mouth Organisms. II—Yeast. 203
Fossa, Canine. W. J. Millinger. (Cur. Lit.) 1370
Fox, C. Mixed Tumors of the Salivary Gland Type Seen in the Pharynx. (Cur. Lit.) 484
Fox, F. W., L. F. Dangerfield, S. F. Gottlich and E. Jokl. Vitamin C Requirements of Native Mine Laborers. (Cur. Lit.) 1690
Fractures and Dislocations of the Jaws and Wounds. D. H. Bellinger. (Cur. Lit.) 486
Malar and Zygomatic, Treatment of. F. Richison. (Cur. Lit.) 484
of Jawbone in Extraction of Tooth; Malpractice. (Legis. Com.) 801
of the Mandible. A Statistical Study of One Hundred Cases. Joseph A. Doherty. 735
of the Maxilla. Frank A. Richison. 558
of the Maxilla, Management of. James B. Davidson and Angus M. Brown. (Cur. Lit.) 1370
of the Maxillae and Mandible. C. M. Logsdon. 389
Franklin, George C. H. Actinomycosis: A New Species, Pathogenic for Man. (Cur. Lit.) 653
Frazer, K. B. Harelip and Cleft Palate. (Cur. Lit.) 1166
French, Ethel L., Helen Tefft, Margaret Rathbun, Jane Eckhardt, Eileen Welch and Harold C. Hodge. Composition of Precolumbian Teeth. (Cur. Lit.) 826
French, J. O., M. L. Hooker, R. B. Vanse and A. L. Robinson. Dental Anesthesia in Children. A Comparison of Vinyl Ether and Ethyl Chloride in a Series of 200 Cases. (Cur. Lit.) 992
Friedman, Lester J. Primary Lymphosarcoma of the Hard Palate. (Cur. Lit.) 1369
Friedman, Samuel. Impacted Upper Fourth Molar. (Incs. of Prac.) 325
Frontispieces
Cady, Frank C. Facing 1863
Carr, J. B. Facing 667
Gentilly, James V. Facing 1703
Hallenberg, Albert. Facing 171
Jordan, L. G. Facing 1003
McLean, David W. Facing 335
Oliver, Oren A. Facing 1643
Schopper, A. F. Facing 837
Timmons, Gerald D. Facing 499
Trustees, Board of, of the American Dental Association, 1939-1940. Facing 1175
Williams, A. P. Facing 1379
Wolfe, Fred J. Facing 3
Fulton, K. Oral Manifestations of Tuberculosis. (Cur. Lit.) 482
Fusospirochetal Infection, Experimental, in Guinea Pigs. Effects of Neoarsphenamine and Sulpharsphenamine on. Theodor Rosebury, Genevieve Foley and F. Rights. (Cur. Lit.) 216
Fusospirochetosis, Therapy of. Henry Field, Jr. (Cur. Lit.) 1166

G

Gabel, A. B. Physical Factors in the Production and Control of Dental Pain. 1411
Gagging. M. Skoblow. (Prac. in Par.) 1533
Galvanism in the Oral Cavity. Gerald J. Reed and Warren Willman. 1471
Gardinier Sedative Cement—Not Acceptable for A. D. R. (Council Dent. Ther.) 119
Garrison, Leland H. Effect of Fevers on the Development of the Rat Incisors. (Cur. Lit.) 1527
Gastro-Intestinal Disease, and Oral Infection. Karl A. Meyer. 93
Gaucher's Disease: Report of a Case. G. C. Tassman and I. B. Bender. 1268
Gavel, Historical, for the American Dental Association. (Assn. Acts.) 1842
Gerlach, Lester A. Dental Activities of the Milwaukee Health Department. (Bur. Pub. Rel.) 1825
Gerson, I. Safe and Quick Method for Enlarging Root Canal for Post Reception Following Regular Root Canal Treatment. (Prac. in Par.) 1534
Gibson, Kenneth R. Rapport of Public Health Officials, Physicians and Dentists in Children's Dentistry. (Bur. Pub. Rel.) 1821
Gies, William J. Dental Education. 99
Dental Education in the Public Interest. 851
Dental Education Including a Study of the Alleged Influence of Derogatory Medical Opinion on Its Institutional Initiation in 1840: Supplementary Comment. 397
Gilbert, W. H. Impacted Incisor and Dentigerous Cyst. (Incs. of Prac.) 326
Gill, J. Raymond. Construction of the Porcelain Veneer Crown. 1884
Gingiva and Oral Mucous Membranes of Rhesus Monkeys, Effect of Castration and Hypophysectomy on. Daniel E. Ziskin and S. N. Hackberg. (Cur. Lit.) 1851
Gingivitis, Desquamative, Chronic. Sidney Sorrin. 250
Hypertrophic, and Paradentosis, Treatment of, by the Use of Acetone. Philip S. Haley. 511
Significance of Bismuth Line in the Mouth. James T. Sweeney. (Incs. of Prac.) 986
Teeth, Tender: Their Gingival Importance. H. T. Roper-Hall and A. P. Bertwistle. (Cur. Lit.) 1852
Gingrass, R. P. Incisive Canal Cysts. 96
Gins, H. A., and Elfriede Paasch. (Bacteriologic Findings in Clinical Actinomycosis.) (Cur. Lit.) 1372
Gold Alloys, Inlay Casting, Certified. (A. D. A. Specification.) (Res. Com.) 792
Effect of Varying Conditions on the Time Required to Cast, Under Air Pressure. Raymond E. Myers and K. R. Pfeiffer. 530
Foil Restoration, Refinement of. George A. Ellsperman. 342
Wire, Wrought, Alloys, Certified. (A. D. A. Specification.) (Res. Com.) 794
Goldman, Henry M., and Kurt H. Thoma. Wandering and Elongation of the Teeth, and Pocket Formation in Parodontosis. 335
Goldstein, Edward, and William Levitien. Multiple Impactions. (Incs. of Prac.) 323
Goldstein, George. Incisor with an Attached Infected Cyst. (Incs. of Prac.) 1695
Goldsworthy, N. E., H. R. Sullivan and J. L. Still. Acid-Production as a Basis for Classifying Lactobacilli from Carious Teeth. (Cur. Lit.) 651
Goll, John. School Dental Service in Norway. (Bur. Pub. Rel.) 941
Gomori, G. Method for Staining Carious Lesions in Teeth. (Cur. Lit.) 1526
Gotshalk, H. C., C. F. Tessmer and J. W. Smith. Malignant Melanoma of the Palate. (Cur. Lit.) 2012
Gottlieb, S. F., F. W. Fox, L. F. Danger-

field and E. Jokl. Vitamin C Requirements of Native Mine Laborers. (Cur. Lit.) 1690
Gottlieb, Bernhard. Simplifying of Pyorrhea Treatment. (Cur. Lit.) 2009
Gower, Stanley M. Tooth Brushing Technics. (Incs. of Prac.) 655
Grace, Edwin J. Anaerobic Hemotoxin-Producing Streptococci in Pyorrhea and Lung Abscess. 1481
Granger, Ernest R. Platinum-Iridium Casting: A New Concept of the Dental Casting Process. 1718
Granof, Samuel. Postoperative Hemorrhage. 555
Grinding (Gritting) of Teeth. Value of Autosuggestion in the Therapy of "Bruxism" and Other Biting Habits. Paul J. Boyens. 1773
Grossman, Louis J. pH of Carious and Non-Carious Dentin. (Cur. Lit.) 1168
Present Status of Pulpless Tooth. (Cur. Lit.) 1368
Root Canal Therapy. (Bibliog.) 608
"Studies on the Local Factors in Dental Caries." (Corres.) 1846
and J. L. T. Appleton. Resterilization of Dental Instruments by the Use of Alcohol and Flaming. 1632
Grover, Charles G. Rocky Mountain Mid-Winter Meeting. (Bur. Pub. Rel.) 784
Grünberg, Hans. New Sublethal Color Mutation in the House Mouse. (Cur. Lit.) 1527
Relations of Endogenous and Exogenous Factors in Bone and Tooth Development: Teeth of the Grey-Lethal Mouse. (Cur. Lit.) 1853
Gudakunst, Don W. Public Health Administration of a Dental Program. (Proc. Am. Public Health Assn., 1939.) 635
Guggenheim Clinic to Extend Its Service. (Assn. Acts.) 1325
Gunshot Wounds of the Face and Jaws; First Aid Treatment, Field Service. R. A. Stout. (Cur. Lit.) 1690
Gunter, John H., and John V. Mershon. Management of Unerupted and Impacted Canines. 1436
Gurley, W. B., and Grant Van Huysen. Histologic Response of the Teeth of Dogs to Operative Procedures. (Cur. Lit.) 1852
Gwynn, B. H., W. A. Bittenbender, E. F. Degering, P. A. Tetrault and C. F. Feasley. Bactericidal Properties of Commercial Antiseptics. (Cur. Lit.) 1528

H

Habits, Biting, and "Bruxism," Value of Autosuggestion in the Therapy of. Paul J. Boyens. 1773
Mouth, Abnormal, Suggestions for the Treatment of. George W. Teuscher. 1703
Hackberg, S. N., and Daniel E. Ziskin. Effect of Castration and Hypophysectomy on the Gingiva and Oral Mucous Membranes of Rhesus Monkeys. (Cur. Lit.) 1851
Hageman, Paul O. Use of Sulfanilamide. 909
Hagner, C. F., F. R. Spencer and W. C. Block. Benign and Malignant Tumors of the Jaw. (Cur. Lit.) 1688
Haldi, J., G. Bachmann, W. Wynn and C. Ensor. Effect of High Calcium and Phosphorus Intake on the Calcium and Phosphorus Balance. (Cur. Lit.) 483
Haley, Philip S. Treatment of Paradentosis and Hypertrophic Gingivitis by the Use of Acetone. 511
Hall, E. Raymond. Supernumerary and Missing Teeth in Wild Mammals of the Orders Insectivora and Carnivora, with Some Notes on Disease. (Cur. Lit.) 1525
Hallenberg, Albert, Death of. 1963
Hals, Einar. Amitosis in the Epithelium Lining the Oral Cavity of the Cat, Guinea-Pig and Mouse. (Cur. Lit.) 2011
Hammens, E., R. Harrison and Z. Zidek. Studies on Lactobacilli. II. Type-Specific Immunological Reactions of Oral Strains. (Cur. Lit.) 317
Hammond, Carolyn, and Ruth Tunnicliff. Artificial Caries Produced by Streptococcus Viridans. (Cur. Lit.) 992
Hanke, Milton Theo. Studies on the Local Factors in Dental Caries. I. Destruction of Plaques and Retardation of Bacterial Growth in the Oral Cavity. 1379; (Corres.) 2005
Hannah, E. Pearl. Annual Report (1938-1939) School Dental Clinic of the Palo Alto (California) Public Schools. (Bur. Pub. Rel.) 144
Hansen, Harold L., and Samuel R. Lewis. Federal Laws on Foods, Drugs, Devices and Cosmetics. 80
Hanslik, Paul J. Health Hazards in Acetanilide-Containing Nostrums and Mixtures. (Council Dent. Ther.) 1505, 1672, 1833
Hardgrove, T. A. Tic Douloureux: Etiology, Accurate Diagnosis and Treatment by the Use of Typhoid Vaccine. 507
Harelip and Cleft Palate. K. B. Frazer. (Cur. Lit.) 1166
Harris, Chapin A. (Portrait) 303
Harris, D. Lawrence. Surface Anesthesia. (Prac. in Par.) 1854
Harris, Samuel D. Contraindications for Pulp Treatment in Deciduous Teeth 1080
Harrison, R. Studies on Lactobacilli. I. Fermentation Reactions of Strains Isolated from Human Mouths. (Cur. Lit.) 485
Z. Zidek and E. Hammens. Studies on Lactobacilli. II. Type-Specific Immunological Reactions of Oral Strains. (Cur. Lit.) 317
Harrison, R. W. Bacteriologic Studies on Experimental Dental Caries in the Rat. I. Bacterial Flora of Normal, Non-Carious Teeth. (Cur. Lit.) 2013
Bacteriologic Studies on Experimental Dental Caries in the Rat. II. Changes in Tooth Surface Flora Associated with Development and Inhibition of Dental Caries. (Cur. Lit.) 2013
Bacteriologic Studies on Experimental Dental Caries in the Rat. III. Flora of Advanced Carious Lesions. (Cur. Lit.) 2013
Benjamin F. Miller and Zelma Baker. Action of a Quaternary Ammonium Type of Wetting Agents on Metabolism of Micro-Organisms Associated with Dental Caries. (Cur. Lit.) 824
Harvard Dental Educational Plan, New. (Editorial) 1483
School, New, of Dental Medicine. (Assn. Acts.) 1156
Häupl, K., and R. Psausky. (Experimental Studies of Transformations in the Mandibular Joint by the Use of Functional Orthopedics of the Jaw.) (Cur. Lit.) 487
Havens, W. P., and H. A. Reimann. Focal Infection and Systemic Disease: A Critical Appraisal. (Cur. Lit.) 825
Hayden, Horace H. (Portrait) 300
Hearman, Cecil D. Digest of the Etiology of Dental Caries: Introducing a New and Original Hypothesis. (Cur. Lit.) 159
Heller, A., and T. Mednedeva. The Rôle of Anaerobic Bacteria in Noma. Clinical and Experimental Observations. (Cur. Lit.) 318
Hemorrhage
Hemostatic Agents. John A. Higgins. 859
Postoperative. Samuel Granof. 555
Prescribing Suggestions. (Council Dent. Ther.) 1311
Suture in. Dorsey R. Tipton. (Prac. in Par.) 321
Herbert, W. E., and J. B. Parfitt. Operative Dental Surgery. (Bibliog.) 1654
Herts, Charles S., and Gordon B. New. Malignant Disease of the Face, Mouth, Pharynx and Larynx in the First Three Decades of Life. (Cur. Lit.) 652
Higgins, John A. Hemostatic Agents. 859
Observations in the Pharmacology of Pro-

caine and Other Drugs. 10
Higley, L. B. Some Controversies Over the Temporomandibular Joint. 594
Hill, Thomas J., and Russell W. Bunting. Textbook of Oral Pathology. (Bibliog.) 937
Hirschfeld, Isador. Periodontal Symptoms Associated with Diabetes. (Cur. Lit.) 161
Histology
Pulps of Embedded and Erupted Third Molar Teeth, A Histologic Study and Comparison of. Bernerd O. A. Thomas. (Cur. Lit.) 886
Review, Recent Critical, of Histologic and Other Researches. A. W. Wellings. (Cur. Lit.) 1688
(Teeth, Rotation of, Some Mechanical and Histologic Problems Connected with.) K. Reitan. (Cur. Lit.) 1369
Tissue Changes the Result of Artificial Stimuli and Injury. William G. Skillen. 1554
History
Dentistry, American, Ohio's Influence upon the Development of. Frederick C. Waite. 1635
Gavel, Historical, for the American Dental Association. (Assn. Acts.) 1842
Hobbs, Laura M., and Iva C. Youmans. Rôle of Streptococcus in Some Dental Infections: a Study of Residual Areas. (Cur. Lit.) 2012
Hodge, Harold C., and Sidney B. Finn. Reduction of Experimental Rat Caries by Fluorine. (Cur. Lit.) 160
Ethel L. French, Helen Tefft, Margaret Rathbun, Jane Eckhardt and Eileen Welch. Composition of Precolumbian Teeth. (Cur. Lit.) 826
R. S. Manly and J. F. Bonner. Light Scattering in Normal Human Dentin. (Cur. Lit.) 1526
J. F. Volker, H. J. Wilson and S. N. Van Voorhis. Adsorption of Fluorides by Enamel, Dentin, Bone and Hydroxyapatite as Shown by the Radioactive Isotopes. (Cur. Lit.) 1691
Hogeboom, Floyde Eddy. New Technical Adaptations in the Practice of Dentistry for Children. 64
Recall System. 1805
Holinger, Paul. Dental Phases of Bronchoscopy. 184
Hooker, M. L., J. O. French, R. B. Vanse and A. L. Robinson. Dental Anesthesia in Children. A Comparison of Vinyl Ether and Ethyl Chloride in a Series of 200 Cases. (Cur. Lit.) 992
Hopkins, Florence B. Has It Been Proved That Sugar Is a Significant Factor in Dental Caries? 1801
and Jean V. Latimer. Frontiers in Dental Health Education. (Proc. Am. Public Health Assn., 1939.) 641
Horn, J. R. Supernumerary Teeth. (Incs. of Prac.) 1694
Horner, Harlan H. Full-Time Secretary for the Council on Dental Education. (Editorial) 1294
Hospital Corps, United States Navy, Handbook of. (Bibliog.) 938
Service Plans, Non-Profit. (Econ.) 647
Houston, Trim. Proximal Immunity. (Bur. Pub. Rel.) 1504
Syphilis—The Dentist's Contact with It. 603
Howles, James K., and Charles Barrett Kennedy. Black Hairy Tongue: A Report of Three Cases. (Cur. Lit.) 2012
Hrdlicka, Ales. Lower Jaw. (Cur. Lit.) 1851
Mandibular and Maxillary Hyperostoses. (Cur. Lit.) 1526
Hubbell, Adrian C., and R. Charles Adams. Intravenous Anesthesia for Dental Surgery with Sodium Ethyl (1-Methylbutyl) Thiobarbituric Acid. 1186
Huber, Ralph F. Dentistry for the Mentally Ill Patient. (Bur. Pub. Rel.) 1129
Hurst, William W. A Complete Immediate Denture Technic for the General Practitioner. 1903
Hyatt, Thaddeus P., and Alfred J. Lotka. The Graphic Drama of Dental Caries. (Bibliog.) 937
Hydrocolloidal Impression Materials: Physical Properties and a Specification. George C. Paffenbarger. 373
Hydrogen-Ion Concentration, Changes in, on Tooth Surfaces and in Carious Lesions. Robert M. Stephan. 718
Hygiene, Mouth, Programs for School Children, A Survey of. (Econ.) 152
Tooth Brushing Technics. Stanley M. Gower. (Incs. of Prac.) 655
Toothbrush, Use of, Anatomic and Physiologic Conditions Governing. T. Sydney Smith. 874
Hyperostoses, Mandibular and Maxillary. Ales Hrdlička. (Cur. Lit.) 1526
Hypnotics. Prescribing Suggestions. (Council Dent. Ther.) 616
Hyperpyrexia (See also Fevers)
Following Operation for Cleft Lip or Palate. H. Irish and C. Stephen. (Cur. Lit.) 161

I

Identification, Request for Aid in. (Assn. Acts.) 819, 1163, 1687, 1847
Illenyl, A. (Aerobic Growth of Anaerobic Dental Bacteria). (Cur. Lit.) 320
Immunity, Proximal. Trim Houston. (Bur. Pub. Rel.) 1504
Impacted Teeth
and Supernumerary Teeth with Cyst: Report of a Case. S. L. Elliott. (Incs. of Prac.) 987
and Unerupted, Canines, Management of. John V. Mershon and John H. Gunter. 1436
Bicuspid, Extraction of, with Improvement in Eyesight. Precioso B. Villareal. (Incs. of Prac.) 324
Impaction, Partial, Obscured, and Maxillary Sinusitis, as Causes of Dental Pain of Undetermined Origin. Joseph D. Berke. 57
Impactions, Multiple. William Levitien and Edward Goldstein. (Incs. of Prac.) 323
Incisor, Impacted, and Dentigerous Cyst. W. H. Gilbert. (Incs. of Prac.) 326
Migrating Mandibular Bicuspid. Fred C. Nerish. (Incs. of Prac.) 990
Molar, Fourth, Upper, Impacted. Samuel Friedman. (Incs. of Prac.) 325
Molar, Third, Inverted. Joel Margaretten. (Incs. of Prac.) 323
Molar, Third, Unerupted, from an Orthodontic Point of View. James W. Ford. 1863
Pulps of Embedded and Erupted Third Molar Teeth, Histologic Study and Comparison of. Bernerd O. A. Thomas. (Cur. Lit.) 886
Should Unerupted Teeth Be Removed? Albin W. Rauch. (Incs. of Prac.) 1694
Supernumerary Teeth. J. R. Horn. (Incs. of Prac.) 1694
Impression Materials, Hydrocolloidal: Physical Properties and a Specification. George C. Paffenbarger. 373
Compounds, Certified. (A. D. A. Specification.) (Res. Com.) 792
Compounds, Dental, American Dental Association Specification No. 3 for: First Revision—1939. W. T. Sweeney and John R. Beall. 713
Impression Technic
Impressions, Correct, Method of Securing. Walter H. Wright. 1584
Impressions, Full Denture, Lower, Pouring. F. D. Steckman. (Prac. in Par.) 321
Tray, Impression. David Waldman. (Prac. in Par.) 157
Trays, Impression, Technic for Constructing, Emergency Partial Dentures and Removable Orthodontic Vulcanite Appliances. F. J. Svoboda. (Prac. in Par.) 321
Wax Distortion, Control of, by Manipulation. R. L. Lasater. 518
Indexing Feature, New, for the Association Activities Section. (Editorial) 773

Indian Dental Service. Raymond Mundt and Harvey E. McDowell. (Cur. Lit.) 1164
Infections, Acute, of the Maxillo-Facial Area, Surgical Pathology of. Malcolm Wallace Carr. (Cur. Lit.) 2010
Deep, of the Head and Neck. Carroll W. Stuart. 922
of a Third Molar, with Deafness. D, C. Woodall. (Incs. of Prac.) 1532
Oral, and Gastro-Intestinal Disease. Karl A. Meyer. 93
Suppurations Around the Angle of the Mandible, Some Considerations of the Pathology and Treatment of. C. Naylor-Strong. (Cur. Lit.) 2009
Ingersoll, William Brown. New and Complete Treatment of Periodontoclasia. 1274
Inhalant in High Arterial Pressure. Prescribing Suggestions. (Council Dent. Ther.) 1832
Injuries, Traumatic, in the Jaws of Infants. Joseph Weinmann and Rudolf Kronfeld. (Cur. Lit.) 1850
to Deciduous Teeth. Reuben Sharenson. (Incs. of Prac.) 328
Inlays and Inlay Casting
Bridge Abutments, Two-Surface Inlays, for. Harold J. Cutler. 1260
Crown and Inlay Casting Technics, Practical Applications of. Earl Allen Nelson. 588
Direct Inlay Method in Compound Cavities of Molars and Bicuspids, Simple Technic for Obtaining Better Gingival Margins by. S. J. Fischer. (Prac. in Par.) 157
Gold Alloys, Inlay Casting, Certified. (A. D. A. Specification.) (Res. Com.) 792
Investments, Inlay Casting. (A. D. A. Specification.) (Res. Com.) 792
Investments, Inlay Casting, Certified, Survey of. (Res. Com.) 1518
Plastics in Heat-Treated Inlay Construction, Experimental Studies of the Possible Use of. G. Sidney Jacks. (Prac. in Par.) 1534
Porcelain Inlay, Technic, Practical, for the Average Operator. William P. Smedley. 352
Wax, Inlay Casting, Revision of American Dental Association Specification No. 4 for. John R. Beall. (Res. Com.) 1140
Waxes, Inlay Casting, Certified. (A. D. A. Specification.) (Res. Com.) 792
Waxes, Inlay Casting, Certified, Survey of. (A. D. A. Specification.) (Res. Com.) 451
Insurance Committee, Report of. (Assn. Acts.) 795
Dental, Liability, Coverage, Judicial Construction of. Leslie Childs. (Legis. Com.) 1679
Wisconsin's, Voluntary, Sickness, Experiments. (Econ.) 478
Internship as a Prerequisite for Dental Licensure. (Editorial) 933
Dental, Applications for. 167, 493, 662, 1859, 2018
Investments, Inlay Casting. (A. D. A. Specification). (Res. Com.) 792
Inlay Casting, Certified, Survey of. (Res. Com.) 1518
Irish, H., and C. Stephen. Hyperpyrexia Following Operation for Cleft Lip or Palate. (Cur. Lit.) 161
Irish, Russell E., Oren A. Oliver and Claude R. Wood. Labio-Lingual Technic. Description of the Labial and Lingual Appliances in the Treatment of Malocclusion. (Bibliog.) 1120
Irwin, Vern D. Short Courses in Dental Health for Public Health Nurses. (Proc. Am. Public Health Assn., 1939.) 635

J

Jacks, G. Sidney. Allergy to Acetanilid. (Incs. of Prac.) 489
Chrome-Plating Aluminum Objects in the Dental Office. (Prac. in Par.) 322
Experimental Studies of the Possible Use of Heat-Treated Plastics in Inlay Construction. (Prac. in Par.) 1534
Precautionary Measures in the Extraction of Superior Third Molars. (Prac. in Par.) 157
Removal of Superficial Bone Spicules. (Prac. in Par.) 985
Simplified Bite-Rim Construction. (Prac. in Par.) 1533
Time Saver in Correcting Bite. (Prac. in Par.) 321
Jacobs, Harvard D. Cavernous Sinus Thrombosis Resulting from a Mandibular Alveolar Abscess of a Deciduous Molar: Report of a Case. 1641
Jacobs, Max H., and Harry Stone. Cysts of the Jaws. (Cur. Lit.) 1528
Jaffer, J. H. Dental Surgeon with Combat Troops. (Cur. Lit.) 1693
Jamieson, Charles H. Mandibular Position and the Partial Denture. 3
Jaw, Lower. Ales Hrdlicka. (Cur. Lit.) 1851
Cysts of. Max H. Jacobs and Harry Stone. (Cur. Lit.) 1528
Jay, Philip. Rôle of Sugar in the Etiology of Dental Caries. 393
Jensen, Arthur L. Dental Health Capacity: Its Evaluation and Prediction. 1003
Johnson, Herbert B., and Charles H. Smith. Treatment of Acute Stomatitis. (Cur. Lit.) 1529
Johnson, James B., and Arthur E. Smith. Surgical Treatment of Mandibular Deformations. 689
Johnson, Leland R. Problem of the Mentalis Muscle in the Treatment of Malocclusion. 1046
Joki, E., F. W. Fox, L. F. Dangerfield and S. F. Gottlich. Vitamin C Requirements of Native Mine Laborers. (Cur. Lit.) 1690
Jones, Hiram A. Problems Confronting School Dental Health Education. (Bur. Pub. Rel.) 1665
Jones, J. Comparison of Cereal and Non-Cereal Diets in the Production of Rickets. (Cur. Lit.) 160
Jones, W. I. A Clinical Picture of Osteomyelitis of the Jaws. 1408

K

Kaiser, Hilda, and Bion R. East. Association of Dental Caries in Children with Sex, Age and Environment. 1430
Kalman, Michael I. Removing Celluloid Form and Silicate. (Prac. in Par.) 985
Karshan, Maxwell. Factors in Saliva Correlated with Dental Caries. (Cur. Lit.) 159
Eli H. Siegel and Leuman M. Waugh. Biochemical Studies of the Saliva of Eskimos. (Cur. Lit.) 653
Eli H. Siegel and Leuman M. Waugh. Dietary and Metabolic Studies of Eskimo Children with and Without Dental Caries. (Cur. Lit.) 653
Karsner, Howard T. Human Pathology. (Bibliog.) 774
Kellogg, W. K., Foundation Institute for Graduate and Post-Graduate Dentistry, Dedication of. (Assn. Acts.) 451, 817
Kelsey, H. E. American Board of Orthodontics. 1271
Kempf, Myrna, and H. D. Palmer. Streptococcus Viridans Bacteremia Following Extraction of Teeth. (Cur. Lit.) 654
Kennedy, Charles Barrett, and James K. Howles. Black Hairy Tongue: Report of Three Cases. (Cur. Lit.) 2012
Keratinisation of the Human Oral Mucosa. Joseph Weinmann. (Cur. Lit.) 994
Keratitis, Dendritic, Caused by Abscessed Teeth. Edward Shapiro and H. D. Coles. 1205
Khalifah, E. S., M. Don Clawson and A. J. Perks. Chronic Endemic Dental Fluorosis (Mottled Enamel). 1569
Kidney, Diseases of, Oral Foci of Infection as Related to. C. Canby. (Cur. Lit.) 483
King, Alfred T. Cellophane. (Prac. in Par.) 985
Stabilizing the Color in Acrylic Resins. (Prac. in Par.) 1854
King, C. G., R. R. Musulin and W. F. Swan-

son. Effects of Vitamin C Intake upon the Degree of Tooth Injury Produced by Diphtheria Toxin. (Cur. Lit.) 2011
King, J. D. Dental Disease in the Island of Lewis. (Cur. Lit.) 1371
Vincent's Disease Treated with Nicotinic Acid. (Cur. Lit.) 1690
Kirwan, C. J. Tooth Fusion. (Incs. of Prac.) 1532
Klaffenbach, Arthur O. Some Important Aspects of Fixed Bridge Restorations. 738
Klassen, K. P., and G. M. Curtis. Calcium and Phosphorus Metabolism in Ossifying Fibroma of the Mandible. (Cur. Lit.) 161
Klein, Henry and Carroll E. Palmer. Studies on Dental Caries. (Cur. Lit.) 1526
and Carroll E. Palmer. "Therapeutic Odontotomy" and "Preventive Dentistry." 1054
John W. Knutson and Carroll E. Palmer. Dental Needs of Grade School Children of Hagerstown, Md. 579
Knowles, Calvin William. Protecting Silicates. (Prac. in Par.) 985
Knowles, Thurston D. Quick-Setting Cement. (Prac. in Par.) 1533
Knudson, A., and R. T. Floody. Fat as a Factor in the Healing of Rickets. (Cur. Lit.) 2011
Knutson, John W., Henry Klein and Carroll E. Palmer. Dental Needs of Grade School Children of Hagerstown, Md. 579
Kohman, E. Oxalic Acid in Foods and Its Behavior and Fate in the Diet. (Cur. Lit.) 482
Kohn, Leonard. Space Retention with Fixed Compensating Bridges. 1086
Kramer, Leon R. Shall We Sell Dentistry Short? (Proc. Am. Public Health Assn., 1939.) 640
Silicosis: A Potential Hazard in Dental Laboratories. (Bur. Pub. Rel.) 1503
Study of a Dental Problem in Public Health. (Bur. Pub. Rel.) 1301
Krashen, Avery S. A Preliminary Report on the Use of Sulfanilamide in the Average Extraction Case. 1199
Kremers, M. Y., H. Bersook and C. G. Wiggins. Relief of Symptoms of Major Trigeminal Neuralgia (Tic Douloureux). (Cur. Lit.) 1693
Krieger, C. H., and Hans Steenbock. Cereals and Rickets: XII. Effect of Calcium and Vitamin D on the Availability of Phosphorus. (Cur. Lit.) 2008
R. Bunkfeldt and H. Steenbock. Cereals and Rickets. X. The Availability of Phytic Acid Phosphorus. (Cur. Lit.) 1691
R. Bunkfeldt and H. Steenbock. Cereals and Rickets. XI. Calcium Phytate as a Source of Calcium. (Cur. Lit.) 2008
Krishnan, B. G., W. R. Aykroyd and R. Passmore. Stomatitis of Dietary Origin. (Cur. Lit.) 485
Kronfeld, Rudolf. Calcium Metabolism and the Teeth. (Cur. Lit.) 828
Clinical Pathology of the Periodontal Pocket. 499
and Joseph Weinmann. Metastatic Adenocarcinoma in the Lower Jawbone. (Cur. Lit.) 1370
and Joseph Weinmann. Traumatic Injuries in the Jaws of Infants. (Cur. Lit.) 1850
Kurth, LeRoy. False Ideas About False Teeth. (Cur. Lit.) 2008
The Posterior Occlusal Plane in Full Denture Construction. 85
Kussy, Joseph. Should Non-Vital Infected Teeth Be Removed? (Incs. of Prac.) 986
Kyrie, P. M. Fixed Restorations and Their Management. 1591

L

Laboratories, Prescriptions for, Required by New York Law. (Assn. Acts.) 1326
Lactobacilli
and Other Acidogenic Organisms, Occurrence of, in the Saliva of Selected Caries-Free Children. Marshall L. Snyder. (Cur. Lit.) 650
Carbohydrate Degradation by Mouth Organisms. II—Yeast. L. S. Fosdick and G. D. Wessinger. 203
from Carious Teeth, Acid-Production as a Basis for Classifying. H. R. Sullivan, J. L. Still and N. E. Goldsworthy. (Cur. Lit.) 651
in the Saliva, Simple Colorimetric Method for Estimation of Relative Numbers of. M. L. Snyder. (Cur. Lit.) 1852
Oral, Decalcifying Ability of Different Strains of, Comparison of. H. R. Sullivan. (Cur. Lit.) 650
Studies on. I. Fermentation Reactions of Strains Isolated from Human Mouths. R. Harrison. (Cur. Lit.) 485
Studies on. II. Type-Specific Immunological Reactions of Oral Strains. R. Harrison, Z. Zidek and E. Hammens. (Cur. Lit.) 317
Lain, Everett S., William Schriever and G. Sherrill Caughron. Problem of Electrogalvanism in the Oral Cavity Caused by Dissimilar Dental Metals. 1765
Lamb, J. Quinine Dermatitis from Anacin. (Cur. Lit.) 482
Langford, W. S. Thumb and Finger Sucking in Childhood. (Cur. Lit.) 319
Lasater, R. L. Control of Wax Distortion by Manipulation. 518
Latimer, Jean V., and Florence B. Hopkins. Frontiers in Dental Health Education. (Proc. Am. Public Health Assn., 1939.) 641
Lawrens, Margaret, H. H. Mitchell and W. A. Ruth. Adaption of Growing Rat to the Ingestion of a Constant Concentration of Fluorine in the Diet. (Cur. Lit.) 1372
Lederer, Francis L., and Louis Z. Fishman. Phlegmons, Including Fascial Sheath Infections, of the Face and Neck of Dental Origin. 1439
Lefkowitz, William. Histological Evidence of the Harmful Effect of Cement Under Orthodontic Bands. (Cur. Lit.) 992
Legislation
Advertising Credit and Terms of Credit, Court Upholds Validity of Restriction on. (Legis. Com.) 1990
Advertising by Dentists, Power of State Dental Boards to Pass Rules Restricting. Samuel R. Lewis, Jr. 403
Anesthetics, Selection and Administration of, Responsibility of the Dentist in. Leslie Childs. (Legis. Com.) 1514
Dentistry, Practice of, Illegal. Walter A. Wilson. 197
Dentistry, Practice of, Judicial Construction of What Constitutes. Leslie Childs. (Legis. Com.) 454
Dentists as Medical Practitioners Within "Privileged Communication" Statutes. Leslie Childs. (Legis. Com.) 133
Dentures, Construction of, as Constituting the Practice of Dentistry—Dental Practice Acts. (Legis. Com.) 966
District of Columbia Dental Law, New. (Editorial) 1291
Employees, Liability of Dentist for Acts of. Leslie Childs. (Legis. Com.) 1839
Federal Laws on Foods, Drugs, Devices and Cosmetics. Samuel R. Lewis and Harold L. Hansen. 80
Insurance, Dental, Liability, Coverage, Judicial Construction of. Leslie Childs. (Legis. Com.) 1679
License, Dental, Lack of Evidence in Suit to Revoke. (Legis. Com.) 1990
Mail Order Denture Problem, Review of. (Legis. Com.) 1143. Correction 1518.
Mail Order Denture, Prosecution for Sale of. (Assn. Acts.) 627
Malpractice: Fracture of Jawbone in Extraction of Tooth. (Legis. Com.) 801
Medicine, Practice of, is a Trade, New Ruling by Federal Court of Appeals Holds That. (Assn. Acts.) 796
Negligence Actions, Dental, Expert Testimony vs. Lay Testimony in. Leslie Childs. (Legis. Com.) 624

Picketing, Dental, Barred. (Legis. Com.) 1518
Prescriptions for Laboratories Required by New York Law. (Assn. Acts.) 1326
Radiodontics, Legal Aspects of. A Sweet. (Cur. Lit.) 483
Res Ipsa Loquitur as Applied to Dental Practice Accidents. Leslie Childs. (Legis. Com.) 798
Research Bill, Dental, (S. 3607), Federal Security Administration Report on. (Assn. Acts.) 1312
Research, Dental, Bill, to Provide $75,000 for, by Public Health Service Is Introduced into Congress of the United States. (Assn. Acts.) 629
Research by Public Health Service Relating to Dental Diseases. Bill (S. 3607). (Assn. Acts.) 964
Sherman Anti-Trust Act, American Medical Association and the. (Assn. Acts.) 1142
State Dental, 1940. (Legis. Com.) 1314
Surgery, Oral, Complications from a Medico-Legal Viewpoint. Leo M. Ford. (Econ.) 1992
Leigh, R. W. Vincent's Stomatitis. (Cur. Lit.) 1525
Leithauser, Daniel J., and Meyer O. Cantor. Massive Doses of Lugol's Solution in Acute Secondary Parotitis. (Cur. Lit.) 995
Leonard, Richard C. Conducting a State-Wide Health Educational Program. (Bur. Pub. Rel.) 1663
Public Dental Health Program. (Proc. Am. Public Health Assn., 1939.) 636
(Leptotrichia, Anaerobic, Contributions to Serologic Differentiation of.) Razi Maner. (Cur. Lit.) 317
(Leptothrix, Contribution to the Bacteriology of.) Erhard Nieber. (Cur. Lit.) 1369
Leukemia, Monocytic, Fatal Case of, with Ulceration and Sloughing of the Soft Palate. Clifford Evans. (Cur. Lit.) 1689
Leukocytes, Migration of, into the Dentinal Tubules. Balint Orban. 239
Leukoplakia Buccalis, and Related Lesions, Treatment of, with Estrogenic Hormone. I. T. Nathanson and D. B. Weisberger. (Cur. Lit.) 320
Levin, I. Pathogenesis and Radium Therapy of Mixed Tumors of the Salivary Glands. (Cur. Lit.) 651
Levin, Oscar L., and Howard T. Behrman. Pigmentation of the Face Following X-Ray Examination of the Jaw. 1599
Levinson, Louis J., and Nathan Peck. Application of Dental Molds to Radium Therapy. (Cur. Lit.) 1688
Levitien, William, and Edward Goldstein. Multiple Impactions. (Incs. of Prac.) 323
Levy, Gilbert J. Toxic Effects of Sulfanilamide. (Cur. Lit.) 827
Lewis, Island of, Dental Disease in. J. D. King. (Cur. Lit.) 1371
Lewis, K., and G. Robbin. Fermentation of Sugar Acids. (Cur. Lit.) 482
Lewis, Samuel R., Jr. Power of State Dental Boards to Pass Rules Restricting Advertising by Dentists. 403
and Harold L. Hansen. Federal Laws on Foods, Drugs, Devices and Cosmetics. 80
Library Bureau, Book List. 977
Lifson, S. S. How Community Dentists Can Participate in a School Dental Program. (Proc. Am. Public Health Assn., 1939.) 634
Lindholm, S. S. (Devitalization of the Vital Pulp with Diathermy). (Cur. Lit.) 1849
Link, Waldemar A. Functional and Esthetic Value of a Space-Maintaining Appliance. (Incs. of Prac.) 327
Lip, Double Lower, Surgical and Anatomical Aspects of a Case of. Michael L. Mason, Barry J. Anson and Lindsay E. Beaton. (Cur. Lit.) 652
Lischer, B. E. Importance of the Facial Features in Diagnosing Dental Anomalies and Mutilation. 1543
Literature, Dental. O. W. Brandhorst. 267
Logsdon, C. M. Fractures of the Maxillae and Mandible. 389
Lotka, Alfred J., and Thaddeus P. Hyatt. The Graphic Drama of Dental Caries. (Bibliog.) 937
Lovett, D. W. The Radiodontic Aspect of Oral Diagnosis. 421
Lozier, Matthew. Roentgenography and Surgery. (Incs. of Prac.) 325
Lucas, A. M., and C. T. Rosenbusch. Studies on the Pathogenicity and Cytological Reactions of the Submaxillary Gland Virus of the Guinea-Pig. (Cur. Lit.) 159
Ludwig's Angina. Ashbel C. Williams. (Cur. Lit.) 652
Lugol's Solution, Massive Doses of, in Acute Secondary Parotitis. Daniel J. Leithauser and Meyer O. Cantor. (Cur. Lit.) 995
Lundquist, G. R. The Zero Crevice in the Management of Periodontal Involvements. 837
Lupus Erythematosus, with Case Report. (Cur. Lit.) 1690
Lymphangioma of the Tongue. J. P. Rigg and R. Waldapfel. (Cur. Lit.) 1371
Lymphosarcoma, Primary, of the Hard Palate. Lester J. Friedman. (Cur. Lit.) 1369
Lynn, Bernard D. Construction of a Simple, Yet Efficient Copper-Plater. (Incs. of Prac.) 323
Lyons, Don Chalmers. Evidence of the Heredity Factor in Opalescent Dentin. 1281
When Is the Time to Straighten Teeth? (Cur. Lit.) 995
Lyon's, Dr., Tooth Powder—Not Acceptable for A. D. R. (Council Dent. Ther.) 1133
Lyons, Harry. Drugs in Periodontal Therapy. 879

M

McCall, John Oppie, and Samuel Stanley Wald. Clinical Dental Roentgenology. (Bibliog.) 1118
McCaskey, C. H. Etiology and Treatment of Seventh Nerve Paralysis. (Cur. Lit.) 991
McClure, F. Effect of Fluorides on Salivary Amylase. (Cur. Lit.) 485
McCollum, B. B. Tooth Preparation in Its Relation to Oral Physiology. 701
McCollum, E. V. Food, Nutrition and Health. (Bibliog.) 1965
McDowell, Harvey E., and Raymond Mundt. Indian Dental Service. (Cur. Lit.) 1164
McLean, David W. The Physiology of Mastication. 226
Mail Order Denture Problem, Review of. Legis. Com.) 1143. Correction, 1518.
Prosecution for Sale of. (Assn. Acts.) 627
Malignant Disease of the Face, Mouth, Pharynx and Larynx in the First Three Decades of Life. Gordon B. New and Charles S. Hertz. (Cur. Lit.) 652
Malocclusion, Treatment of, Description of the Labial and Lingual Appliances in. Labio-Lingual Technic. Oren A. Oliver, Russell E. Irish and Claude R. Wood. (Bibliog.) 1120
Mentalis Muscle, Problem of, in the Treatment of Malocclusion. 1046
Overbites. Sherwood R. Steadman. (Cur. Lit.) 1853
Maloof, Edward C., John W. Trask and Edwin E. Ziegler. The Solvent Action of Various Substances on Teeth: A Quantitative Determination. 1013
Malpractice: Fracture of Jawbone in Extraction of Tooth. (Legis. Com.) 801
Mandible, Measurements of the Ascending Ramus of. Bela Szokoloczy-Syllaba. (Cur. Lit.) 650
Unusual Anatomic Markings in. M. Schneider. (Incs. of Prac.) 1531
Mandibular Deformations, Surgical Treatment of. Arthur E. Smith and James B. Johnson. 689
(Mandibular Joint, Experimental Studies of, by the Use of Functional Orthope-

dics of the Jaw.) K. Häupl and R. Psausky. (Cur. Lit.) 487
Mandibular Position and the Partial Denture. Charles H. Jamieson. 3
Mandibulograph, Centric and Eccentric Occlusion in Full Dentures, with. Thomas E. J. Shanahan. 708
Maner, Razi. (Contributions to Serologic Differentiation of Anaerobic Leptotrichia). (Cur. Lit.) 317
Manley, C. B. Investigation into Pulp Reactions to Various Filling Materials. (Cur. Lit.) 2010
Manly, R. S., J. F. Bonner and H. C. Hodge. Light Scattering in Normal Human Dentin. (Cur. Lit.) 1526
Manson-Bahr, P. Glossitis and Vitamin B Complex in Pellegra, Sprue and Allied States. (Cur. Lit.) 2012
Margaretten, Joel. An Inverted Third Molar. (Incs. of Prac.) 323
Marinelli, Virgil. Traumatic Trismus: Report of a Case. (Incs. of Prac.) 656
Marré, John M. Supernumerary Teeth. 212
Marrow, Red, in the Jaws. Lester R. Cahn. 1056
Martin, H. E., and E. L. Sugarbaker. Cancer of the Mouth. (Cur. Lit.) 1691
Mason, Michael L., Barry J. Anson and Lindsay E. Beaton. Surgical and Anatomical Aspects of a Case of Double Lower Lip. (Cur. Lit.) 652
Massachusetts Institute of Technology Offers Summer Courses in Public Health. (Bur. Pub. Rel.) 295
Massler, M., and Isaac Schour. Studies in Tooth Development: The Growth Pattern of Human Teeth. Part I. 1778; Part II, 1918
Mastication, Physiology of. David W. McLean. 226
Matuschak, Margaret C., Gerald J. Cox, Mary L. Dodds and Sara F. Dixon. Experimental Dental Caries. III. A System of Recording Corn Meal Caries in Rats. (Cur. Lit.) 824
Gerald J. Cox, Sara F. Dixon, Mary L. Dodds and W. E. Walker. Experimental Dental Caries. IV. Fluorine and Its Relation to Dental Caries. (Cur. Lit.) 991
Maxilla, Fractures of, Management of James B. Davidson and Angus M. Brown. (Cur. Lit.) 1370
Superior, Acute Osteomyelitis of, in Young Infants. N. Asherson. (Cur. Lit.) 1369
Maxillary Sinusitis and Obscured Partial Impaction as Causes of Dental Pain of Undetermined Origin. Joseph D. Berke. 57
Maxwell, J. H. Differential Diagnosis of Acute Inflammatory Swellings of the Face and Neck. 1243
Mead, Sterling V. Diseases of the Mouth. (Bibliog.) 441
Oral Surgery. (Bibliog.) 1813
Meade, William H., and Alton Ochsner. Relative Value of Catgut, Silk, Linen and Cotton as Suture Material. (Cur. Lit.) 1368
Medical Care, Summary of the American Medical Association's Study on. (Econ.) 476
(Symposium). Law and Contemporary Problems. (Bibliog.) 938
Medicine, Practice of, Is a Trade, New Ruling by Federal Court of Appeals Holds That. (Assn. Acts.) 796
Mednedeva, T., and A. Heller. Rôle of Anaerobic Bacteria in Noma. Clinical and Experimental Observations. (Cur. Lit.) 318
Meeting Announcements. 165, 329, 490, 659, 829, 996, 1169, 1373, 1535, 1696, 1855, 2014
Melanoma, Malignant, of the Palate. H. C. Gotshalk, C. F. Tessmer and J. W. Smith. (Cur. Lit.) 2012
Mellanby, Helen. Dental Hypoplasia and Caries Among the Children of Finnish Lapps. (Cur. Lit.) 1372
Melville, A. G. G. Double Radium Mould Treatment of Carcinoma of the Floor of the Mouth and Lower Alveolus. (Cur. Lit.) 2010
Membership, American Dental Association. (Assn. Acts.) 452
Mentalis Muscle, Problem of, in the Treatment of Malocclusion. 1046
Merck Index. (Bibliog.) 275
Mercuries, Dental, Certified. (A. D. A. Specification.) (Res. Com.) 794
Merritt, Arthur H. American Red Cross. President's Message. 1123
Centennial of American Dentistry. President's Address. 1794
Cleveland Meeting—September 9-13. President's Message. 1299
Cleveland Next: "The Centennial Year of American Dentistry." President's Message. 940
Dues of the American Dental Association: Should They Be Increased? President's Message. 284
Inner Workings of the American Dental Association. President's Message. 1122
Last Call for Cleveland. President's Message. 1494
On to Baltimore. President's Message. 449
Periodontal Diseases. Diagnosis and Treatment. (Bibliog.) 274
President of the American Dental Association, Testimonial Dinner to. (Assn. Acts.) 289
Progress of American Dentistry. 1103
Research Activities of the American Dental Association. President's Message. 776
What Is the American Dental Association Doing for Me? President's Message. 122
Mershon, John V., and John H. Gunter. Management of Unerupted and Impacted Canines. 1436
Metabolism
Calcium and Phosphorus Balance, Effect of High Calcium and Phosphorus Intake on. J. Haldi, G. Bachmann, W. Wynn and C. Ensor. (Cur. Lit.) 483
Calcium, and the Teeth. Rudolf Kronfeld. (Cur. Lit.) 828
Meyer, Karl A. Oral Infection and Gastro-Intestinal Disease. 93
Milian, G. (Plasmocytoma of the Tongue.) (Cur. Lit.) 317
Military Affairs Committees, State, Chairmen. 1819
Miller, Benjamin F., Zelma Baker and R. W. Harrison. Action of a Quaternary Ammonium Type of Wetting Agent on Metabolism of Micro-Organisms Associated with Dental Caries. (Cur. Lit.) 824
John A. Muntz and Sigmund Bradel. Decomposition of Carbohydrate Substrates by Dental Plaque Material. (Cur. Lit.) 2008
Miller, I. Franklin. The Great Publicity Myth and Its Moral. (Bur. Pub. Rel.) 779
Miller, Howard C. Fundamental Principles in the Management of Oral Disease. 1238
Charles G. Darlington, George W. Wilson, Walter H. Wright and George R. Moore. 1939 Year Book of Dentistry. (Bibliog.) 440
Miller, Samuel Charles, and Harry Roth. Torus Palatinus: A Statistical Study. 1950
Millinger, W. J. The Canine Fossa. (Cur. Lit.) 1370
Mills, C. A. Fluoride in Drinking Water and Dental Caries. (Cur. Lit.) 825
Milwaukee Health Department, Dental Activities of. Lester A. Gerlach. (Bur. Pub. Rel.) 1825
Missouri Plan. Paul F. O'Brien. (Econ.) 1317
Mitchell, H. H., Margaret Lawrenz and W. A. Ruth. Adaption of Growing Rat to the Ingestion of a Constant Concentration of Fluorine in the Diet. (Cur. Lit.) 1372
Mobilization, Dentistry in. Leigh C. Fairbank. (Assn. Acts.) 1972
of the Dental Profession. Questions and Answers. (Assn. Acts.) 1975
Plan, Army Medical. (Assn. Acts.) 1142
Moen, Obed H. Verification of Results of

Root Resection by Photomicrographs. 1071
Mongolism, Growth Disorder of the Skull in. Clemens E. Benda. (Cur. Lit.) 995
Moore, George R., Charles G. Darlington, George W. Wilson, Howard C. Miller and Walter H. Wright. 1939 Year Book of Dentistry. (Bibliog.) 440
Moore, Thomas E. Cooperation in Research. 400
Moore, Thomas R. Gnathostatic Diagnosis of "Denture Mutilations." 862
Morgan, George E. How Childhood Fears Toward Dentistry Can Be Controlled. 766
Morgareidge, K., and S. B. Finn. Effect of Fluorine on the Activity of Vitamin D in Rachitic Rats. (Cur. Lit.) 1693
Morrey, Lon W. Dental Health Education Needs. 1623
Mosher, D. Nutrition as a Factor in Periodontal Conditions. (Cur. Lit.) 161
Mottled Enamel. Chronic Endemic Dental Fluorosis. M. Don Clawson, E. S. Khalifah and A. J. Perks. 1569
Durability of Mottled Teeth, Observations on. Margaret C. Smith and H. V. Smith. (Cur. Lit.) 2011
Enamel, Preferential Mottling of, of Rat Molars. S. F. Dixon and G. J. Cox. (Cur. Lit.) 487
Fluorine in the Diet, Adaption of Growing Rat to the Ingestion of a Constant Concentration of. Margaret Lawrenz, H. H. Mitchell and W. A. Ruth. (Cur. Lit.) 1372
Fluorosis, Endemic, Chronic, in Northern India. C. D. Marshall Day. (Cur. Lit.) 1371
Sodium Fluoride in a Dry Diet in Milk and in Water, A Study of the Relative Toxicity of. Cecilia Schuck. (Cur. Lit.) 651
Water, Dangerous. G. Abbott. (Cur. Lit.) 162
Mouth, Diseases of. Sterling V. Mead. (Bibliog.) 441
Palate, Soft, Ulceration and Sloughing of, A Fatal Case of Monocytic Leukemia with. Clifford Evans. (Cur. Lit.) 1689
Rinse, Saline. Prescribing Suggestions. (Council Dent. Ther.) 956
Wash. Prescribing Suggestions. (Council Dent. Ther.) 957, 1311
(Mucin, Action of, in Bacterial Infection.) Genesio Pacheco and J. Noronha Peres. (Cur. Lit.) 1167
Gastric and Salivary, Action of, on Phagocytosis. Ruth Tunnicliff. (Cur. Lit.) 1166
Mundt, Raymond, and Harvey E. McDowell. Indian Dental Service. (Cur. Lit.) 1164
Munts, John A., Benjamin F. Miller, and Sigmund Bradel. Decomposition of Carbohydrate Substrates by Dental Plaque Material. (Cur. Lit.) 2008
Musulin, R. R., C. G. King, and W. F. Swanson. Effects of Vitamin C Intake upon the Degree of Tooth Injury Produced by Diphtheria Toxin. (Cur. Lit.) 2011
Myers, Raymond E., and K. R. Pfeiffer. Effect of Varying Conditions on the Time Required to Cast Gold Under Air Pressure. 530

N

Nathanson, I. T., and D. B. Weisberger. Treatment of Leukoplakia Buccalis and Related Lesions with Estrogenic Hormone. (Cur. Lit.) 320
National Board of Dental Examiners. (Editorial) 1806
Candidates Who Successfully Completed Parts I and II of Examinations of. (Assn. Acts.) 628, 1519
National Defense
Committee on. (Assn. Acts.) 452
Dental Preparedness. (Editorial) 1810
Dental Preparedness, Committee on. (Assn. Acts.) 1658, 1818, 1970
Headquarters of Army Corps Areas, and Dental Surgeons in Charge. (Assn. Acts.) 1820
Mobilization Plan, Army Medical. (Assn. Acts.) 1142
National Formulary, VI and U. S. P. XI, The Era-Key to. Lyman D. Fonda. (Bibliog.) 1814
National Health Program
and Dentistry. Harold W. Oppice. 33
Bill to Provide $75,000 for Dental Research by Public Health Service Is Introduced into Congress of the United States. (Assn. Acts.) 629
Committee. (Assn. Acts.) 124, 286
Committee, New Booklet of. (Assn. Acts.) 135
Committee. Research Bill, Dental, S. 3607. (Assn. Acts.) 1844
Medical Care (Symposium). Law and Contemporary Problems. 938
National Research Council, Committee on Surgery of. (Assn. Acts.) 1326
Naylor-Strong C. Some Considerations of the Pathology and Treatment of Suppurations Around the Angle of the Mandible. (Cur. Lit.) 2009
Navy Dental Corps, Examination for Appointment in. 166, 494, 662, 833, 999, 1171, 1539, 1700, 2018
Nedzel, A. J. Vascular Spasm and Bacterial Localization. 1285
Nelson, C. Truman, David Weisberger and Paul E. Boyle. Development of Caries in the Teeth of Albino Rats Following Extirpation of the Salivary Glands. (Cur. Lit.) 654
Nelson, Earl Allen. Practical Applications of Crown and Inlay Casting Technics. 588
Nelson, Peter A. Early Diagnosis of Intra-Oral Cancer. 1644
Neoarsphenamine and Sulpharsphenamine, Effects of, on Experimental Fusospirochetal Infection in Guinea Pigs. Theodor Rosebury, Genevieve Foley and F. Rights. (Cur. Lit.) 316
Prescribing Suggestions. (Council Dent. Ther.) 1136
Nerish, Fred C. Migrating Mandibular Bicuspid. (Incs. of Prac.) 990
Netherlands East Indies, Dentistry in. (Bur. Pub. Rel.) 291
Neuralgia, Trigeminal, Major (Tic Douloureux), Relief of Symptoms of. H. Bersook, M. Y. Kremers and C. G. Wiggins. (Cur. Lit.) 1693
Trigeminal, Treatment of: Peripheral Nerve Block. James L. Popper. (Cur. Lit.) 1528
Neurohr, Ferdinand G. Partial Dentures. A System of Functional Restoration. (Bibliog.) 118
New, Gordon B., and John B. Erich. Retruded Chins: Correction by Plastic Operation. (Cur. Lit.) 1528
and Charles S. Hertz. Malignant Disease of the Face, Mouth, Pharynx and Larynx in the First Three Decades of Life. (Cur. Lit.) 652
Nicoll, Dorothea, and Mark D. Elliott. Reduction of Dental Caries by Dietary Supplement. (Proc. Am. Public Health Assn., 1939.) 639
Nicotinic Acid, Vincent's Disease Treated with. J. D. King. (Cur. Lit.) 1690
Nieber, Erhard. (A Contribution to the Bacteriology of Leptothrix). (Cur. Lit.) 1369
Ninomiya, H. (A Contribution to Our Knowledge of Salivary Amylase). (Cur. Lit.) 1168
Noma. Albert Eckstein. (Cur. Lit.) 994
Rôle of Anaerobic Bacteria in. Clinical and Experimental Observations. A. Heller and T. Mednedeva. (Cur. Lit.) 318
Norway, School Dental Service in. Johs. Goll. (Bur. Pub. Rel.) 941
Novitsky, J. Dead Teeth and the Antrum of Highmore. (Cur. Lit.) 484
Noyes, Frederick B., Honored. (Assn. Acts.) 1158, 1328, 1519, 1844
Nursing Training Schools, Montana, Dental Lectures in. (Assn. Acts.) 143
Nutrition as a Factor in Periodontal Conditions. D. Mosher. (Cur. Lit.) 161

Ascorbic Acid, Observations on the Amount of, Required to Maintain Tissue Saturation in Normal Adults. E. Neige Todhunter and Ruth C. Robbins. (Cur. Lit.) 994
Cereals and Rickets. X. Availability of Phytic Acid Phosphorus. C. H. Krieger, R. Bunkfeldt and H. Steenbock. (Cur. Lit.) 1691
Relation of, to Dental Caries; Review of Recent Findings. L. M. Fleisch. 550
Taste Threshold and Taste Preferences of Rats for Five Common Sugars. C. P. Richter and K. H. Campbell. (Cur. Lit.) 1529

O

O'Brien, Paul F. The Missouri Plan. (Econ.) 1317
Occlusion, Centric and Eccentric, in Full Dentures, with the Mandibulograph. Thomas E. J. Shanahan. 708
Posterior Occlusal Plane in Full Denture Construction. L. E. Kurth. 85
Ochsner, Alton, and William H. Meade. Relative Value of Catgut, Silk, Linen and Cotton as Suture Material. (Cur. Lit.) 1368
Odontoma, Composite. Keith L. Buechele. 1479
Compound Composite. E. K. Tratman. (Cur. Lit.) 1529
Follicular. Joseph L. Bernier. (Cur. Lit.) 1370
Odontotomy, Prophylactic, Does Experience Justify? H. Shirley Dwyer. 1092
Prophylactic, Has Experience Justified? Milton J. Waas. 1095
"Therapeutic" and "Preventive Dentistry." Henry Klein and Carroll E. Palmer. 1054
Officers and Trustees, Directory of. 1, 665, 1861
State Society (1939-1940) 138
Oglethorpe University Crypt of Civilization. (Bur. Pub. Rel.) 292
Ohio's Influence upon the Development of American Dentistry. Frederick C. Waite. 1635
Oliver, Oren A., Russell E. Irish and Claude R. Wood. Labio-Lingual Technic. A Description of the Labial and Lingual Appliances in the Treatment of Malocclusion. (Bibliog.) 1120
Opalescent Dentin, Evidence of the Heredity Factor in. Don C. Lyons. 1281
Operative Dentistry
Cavity Rinse. Prescribing Suggestions. (Council Dent. Ther.) 1136
Contacts and Contours. A. Hubert Fee. 1035
Histologic Response of the Teeth of Dogs to Operative Procedures. W. B. Gurley and Grant Van Huysen. (Cur. Lit.) 1852
Local Anesthesia: Its Application in. Glenn W. Berry. (Cur. Lit.) 1164
Operative Dental Surgery. J. B. Parfitt and W. E. Herbert. (Bibliog.) 1654
Oppice, Harold W. Dentistry and the National Health Program. 33
Oral Surgery. Sterling V. Mead. (Bibliog.) 1813
Anesthesia, General, Technic for, in Surgery of the Mouth. George W. Christiansen. 1575
Anesthetic Agent, Suitable, Selecting, for Exodontia and Oral Surgery. James R. Cameron. (Cur. Lit.) 161
Ankylosis, Temporomandibular, and Its Surgical Correction. Don H. Bellinger. 1563
Bone Spicules, Superficial, Removal of. G. Sidney Jacks. (Prac. in Par.) 985
Deformations, Mandibular, Surgical Treatment of. Arthur E. Smith and James B. Johnson. 689
Deformity, Oral, Congenital, and Its Correction. David Bellock. 1627
Disease, Oral, Fundamental Principles in Management of. Howard C. Miller. 1238 (Legal Actions.) Oral Surgery Complications from a Medico-Legal Viewpoint. Leo M. Ford. (Legis. Com.) 1992
Prognathism, Gross, of the Upper Jaw, Improving the Mastication Efficiency and Facial Esthetics in a Case of, by Means of Oral Surgery. W. N. Brashears, W. G. Edmonds and T. E. Drewett. (Cur. Lit.) 1372
Retruded Chins: Correction by Plastic Operation. Gordon B. New and John B. Erich. (Cur. Lit.) 1528
Suture Material, Relative Value of Catgut, Silk, Linen and Cotton as. (Cur. Lit.) 1368
Swellings, Acute Inflammatory, of the Face and Neck, Differential Diagnosis of. J. H. Maxwell. 1243
War. Richard H. Riethmuller. 894
Orban, Balint. Migration of Leukocytes into the Dentinal Tubules. 239
Organizations, Dental, in the United States: A Century of Achievement. Harry Bear. 425
Orthodontia
Aiding Your Child to Face the World. J. A. Salzmann. (Bur. Pub. Rel.) 1983
Arches, Dental, in Children, Growth and Development of. Joseph T. Cohen. 1250
Cement, Harmful Effect of, Under Orthodontic Bands, Histological Evidence of. William Lefkowitz. (Cur. Lit.) 992
Congenital Oral Deformity and Its Correction. David Bellock. 1627
Facial Features, Importance of, in Diagnosing Dental Anomalies and Mutilation. B. E. Lischer. 1543
"Facts for Health Workers." (Bur. Pub. Rel.) 293
for Health Workers, Facts About. (Bur. Pub. Rel.) 642
Mail Order. Charles R. Baker. 408
Molar, Unerupted Third, from an Orthodontic Point of View. James W. Ford. 1863
Orthodontics, American Board of. H. E. Kelsey. 1271
Orthodontists, American Association of. (Bur. Pub. Rel.) 293
Overbites, Six Different Kinds of. Sherwood R. Steadman. 1060
Problem, Review of. A. L. Thomas. 1751
Science and Practice of, Contribution of the Eastern Association of Graduates of the Angle School of Orthodontia to the. (Bibliog.) 1654
Space-Maintaining Appliance, Functional and Esthetic Value of. Waldemar A. Link. (Incs. of Prac.) 327
Time, When Is the, to Straighten Teeth? Don Chalmers Lyons. (Cur. Lit.) 995
Tissue Changes Following Rotation of Teeth in the Dog. William J. Skillen and Kaare Reitan. (Cur. Lit.) 1849
Trays, Impression, Vuicanite, Technic for Constructing, Emergency Partial Dentures and Removable Orthodontic Vulcanite Appliances. F. J. Svoboda. (Prac. in Par.) 821
Treatment, Evaluation of Root Resorption Occurring During. Charles R. Rudolph. (Cur. Lit.) 1849
(Orthopedics, Functional, of the Jaw, Experimental Studies of Transformations in the Mandibular Joint by the Use of.) K. Häupl and R. Psausky. (Cur. Lit.) 487
Osteoma of the Maxillary Sinus. A. G. Rawlins. (Cur. Lit.) 1851
Osteomalacia and Dental Caries. G. F. Taylor and C. D. M. Day. (Cur. Lit.) 1850
Osteomyelitis, Acute, of the Superior Maxilla in Young Infants. N. Asherson. (Cur. Lit.) 1369
of the Jaws, Clinical Picture of. W. I. Jones. 1408
Osteoporosis, Cranial, Congenital: Its Etiology and Significance, A Study of Eight Hundred New-Born Infants. Oscar Reiss and Elena Boder. (Cur. Lit.) 1368
Osteotomy. Surgical Treatment of Mandibular Deformations. Arthur E. Smith and James B. Johnson. 689

Overbites, Six Different Kinds of. Sherwood R. Steadman. 1060
Owen, J. F. Do Dental Health Programs Improve Dental Conditions? (Econ.) 1681
Oxalic Acid in Foods and Its Behavior and Fate in the Diet. E. Kohman. (Cur. Lit.) 482

P

Paasch, Elfriede, and H. A. Gins. (Bacteriologic Findings in Clinical Actinomycosis.) (Cur. Lit.) 1372
Pacheco, Genesio, and J. Noronha Peres. (Action of Mucin in Bacterial Infection.) (Cur. Lit.) 1167
Paffenbarger, George C. Hydrocolloidal Impression Materials: Physical Properties and a Specification. 373
Silicate Cement: An Investigation by a Group of Practicing Dentists Under the Direction of the A. D. A. Research Fellowship at the National Bureau of Standards. 1611
Pain, Dental, of Undetermined Origin, Maxillary Sinusitis and Obscured Partial Impaction as Causes of. Joseph D. Berke. 57
Production and Control of, Physical Factors in. A. B. Gabel. 1411
Palate, Hard, Primary Lymphosarcoma of. Lester J. Friedman. (Cur. Lit.) 1369
Malignant Melanoma of. H. C. Gotshalk, C. F. Tessmer and J. W. Smith. (Cur. Lit.) 2012
Soft, Ulceration and Sloughing of, A Fatal Case of Monocytic Leukemia with. Clifford Evans. (Cur. Lit.) 1689
Palmer, C. E., and Henry Klein. Studies on Dental Caries. (Cur. Lit.) 1526
and Henry Klein. "Therapeutic Odontotomy" and "Preventive Dentistry." 1054
John W. Knutson and Henry Klein. Dental Needs of Grade School Children of Hagerstown, Md. 579
Palmer, H. D., and Myrna Kempf. Streptococcus Viridans Bacteremia Following Extraction of Teeth. (Cur. Lit.) 654
Papers, Dental, American Dental Association Standards for. (Assn. Acts.) 1159
(Paradentium: Its Pathology and Treatment). Francisco M. Pucci. (Bibliog.) 1815
Paradentosis and Hypertrophic Gingivitis, Treatment of, by the Use of Acetone. Philip S. Haley. 511
(Biomechanics of.) Konrad Thielemann. (Bibliog.) 1119
Diabetics, Juvenile, Oral and Roentgenographic Aspects of the Teeth and Jaws of. C. E. Rutledge. 1740
Wandering and Elongation of the Teeth, and Pocket Formation in. Kurt H. Thoma and Henry M. Goldman. 335
Paralysis, Seventh Nerve, Etiology and Treatment of. C. H. McCaskey. (Cur. Lit.) 991
Parfitt, J. B., and W. E. Herbert. Operative Dental Surgery. (Bibliog.) 1654
Parotid Gland, Carcinoma of, in Youth. T. Case. (Cur. Lit.) 319
Parotitis, Acute, Secondary, Massive Doses of Lugol's Solution in. Daniel J. Leithauser and Meyer O. Cantor. (Cur. Lit.) 995
Passmore, R., W. R. Aykroyd and B. G. Krishnan. Stomatitis of Dietary Origin. (Cur. Lit.) 485
Patent, Process, Committee. (Assn. Acts.) 1148
Patents, United States, Applicable or Pertaining to Dentistry. 168, 496, 664, 834, 1000, 1172, 1540, 1700, 1860, 2020
Pathology, Human. Howard T. Karsner. (Bibliog.) 774
Oral and Dental, Atlas of. (Assn. Acts.) 797
Oral (Pathosis), in Monkeys in Various Experimental Dietary Deficiencies. T. H. Tomlinson, Jr. (Cur. Lit.) 158
Oral, Textbook of. Russell W. Bunting and Thomas J. Hill. (Bibliog.) 937
Submaxillary Gland Virus of the Guinea-Pig, Studies on the Pathogenicity and Cytological Reactions of. C. T. Rosenbusch and A. M. Lucas. (Cur. Lit.) 159
Peck, Nathan, and Louis J. Levinson. Application of Dental Molds to Radium Therapy. (Cur. Lit.) 1688
Pedersen, P. O. (Nutrition and Dental Caries in Primitive and "Civilized" Greenlanders). (Cur. Lit.) 653
Peller, S. Life Expectancy and Mortality from Skin and Lip Cancer. (Cur. Lit.) 1692
Pelton, W. J. Three to Six Appeal. (Bur. Pub. Rel.) 1496
Pelzer, Rudolph H. A Study of the Local Oral Effect of Diet on the Periodontal Tissues and the Gingival Capillary Structure. 13
Pemberton, John. Rapid Method of Differentiating Children with Large or Small Reserves of Vitamin C. (Cur. Lit.) 1852
Pendleton, Elbert Crosby. Reaction of Human Jaws to Prosthetic Dentures. 667
Pennsylvania, University of, Bicentennial Conference. (Assn. Acts.) 1524
Peres, J. Noronha, and Genesio Pacheco. (Action of Mucin in Bacterial Infection.) (Cur. Lit.) 1167
Periodontia
Diabetes, Periodontal Symptoms Associated with. Isador Hirschfeld. (Cur. Lit.) 161
Diagnosis and Treatment. Periodontal Diseases. Arthur H. Merritt. (Bibliog.) 274
Diet, Study of Local Oral Effect of, on the Periodontal Tissues and the Gingival Capillary Structure. Rudolph H. Pelzer. 13
Drugs in Periodontal Therapy. Harry Lyons. 879
Flap Operation and Its Place in the Treatment of Periodontal Lesions. Robert L. Dement. 1761
Nutrition as a Factor in Periodontal Conditions. D. Mosher. (Cur. Lit.) 161
Pocket, Periodontal, Clinical Pathology of. Rudolf Kronfeld. 499
Surgical Treatment of Periodontal Lesions, Consideration of. Raoul H. Blanquie. 757
Tissue Changes Following Rotation of Teeth in the Dog. William J. Skillen and Kaare Reitan. (Cur. Lit.) 1849
Tissue Changes the Result of Artificial Stimuli and Injury. William G. Skillen. 1554
Treatment, New and Complete, of Periodontoclasia. William Brown Ingersoll. 1274
Trench Mouth. Bacteriology of, and Its Treatment. Charles Dillon. (Cur. Lit.) 1850
Vincent's Infection, Dangers in Treating, by the Spray Method. L. G. Barrett. (Incs. of Prac.) 488
Vincent's Stomatitis. R. W. Leigh. (Cur. Lit.) 1525
(Vitamin C Deficiency in Relation to Paradental and Carious Lesions.) F. Ruspa. (Cur. Lit.) 1526
Zero Crevice in Periodontal Involvements, Management of. G. R. Lundquist. 837
Perks, A. J., M. Don Clawson and E. S. Khalifah. Chronic Endemic Dental Fluorosis. (Mottled Enamel). 1569
Peterka, Charles. A Modern Three-Quarter Veneer Crown. 1175
Pfaffmann, Carl. Afferent Impulses from the Teeth Due to Pressure and Noxious Stimulation. (Cur. Lit.) 652
Pfahler, G. E., and J. H. Vastine, 2d. The Roentgen Diagnosis of Cancer of the Accessory Sinuses. (Cur. Lit.) 1692
Pfeiffer, K. H., and Raymond E. Myers. Effect of Varying Conditions on the Time

Required to Cast Gold Under Air Pressure. 530
Phagocytosis, Action of Gastric and Salivary Mucin on. Ruth Tunnicliff. (Cur. Lit.) 1166
Pharmacopoeia, U. S., XI and National Formulary, Era-Key to. Lyman D. Fonda. (Bibliog.) 1814
Pharynx, Mixed Tumors of the Salivary Gland Type Seen in. C. Fox. (Cur. Lit.) 484
Phillips, D. W. Positive Mechanical Bridge Fixation. 1418
Phlegmons, Including Fascial Sheath Infections, of the Face and Neck of Dental Origin. Francis L. Lederer and Louis Z. Fishman. 1439
Phosphates, Exchange of, by Enamel and Dentin, In Vitro Experiments on. W. D. Armstrong. (Cur. Lit.) 1526
Phosphorus, and Calcium Balance, Effect of High Intake on. J. Haldi, G. Bachmann, W. Wynn and C. Ensor. (Cur. Lit.) 483
Availability of, Effect of Calcium and Vitamin D on. XII. Cereals and Rickets. C. H. Krieger and Hans Steenbock. (Cur. Lit.) 2008
Phytic Acid, Availability of. X. Cereals and Rickets. C. H. Krieger, R. Bunkfeldt and H. Steenbock. (Cur. Lit.) 1691
Physiology, Textbook of. William D. Zoethout and W. W. Tuttle. (Bibliog.) 938
Marrow, Red, in the Jaws. Lester R. Cahn. 1056
Oral, Tooth Preparation in Its Relation to. B. B. McCollum. 701
Picketing, Dental, Barred. (Legis. Com.) 1518
Pierce, A. Chronic Fluorine Intoxication in Domestic Animals. (Cur. Lit.) 162
Pigmentation of the Face Following X-Ray Examination of the Jaw. Oscar L. Levin and Howard T. Behrman. 1599
Pincus, Paul. Saliva: A Short Account of a Property Previously Undescribed. (Cur. Lit.) 828
B. Fickling and B. Boyd-Cooper. M & B 693 in the Saliva. (Cur. Lit.) 653
Pinecrrhea. (Council Dent. Ther.) 1139
(Plasmocytoma of the Tongue.) G. Milian. (Cur. Lit.) 317
Plastic Surgery
Plastic Repair, and Surgery of Injury. Samuel Fomon. (Bibliog.) 440
Rhinoplastic Surgical Procedure, Dental Molding, Compound Cast and Adhesive Strapping in. Gustave Anfricht. (Cur. Lit.) 1688
Plastics, Heat-Treated, in Inlay Construction, Experimental Studies of the Possible Use of. G. Sidney Jacks. (Prac. in Par.) 1534
Platinum-Iridium Casting: A New Concept of the Dental Casting Process. Ernest R. Granger. 1718
Pledge, Dental, (Bur. Pub. Rel.) 644
Pommer, Matthew. Tooth Fusion. (Incs. of Prac.) 1695
Pontics, Anterior, Lower, Construction of, Without Display of Gold. S. E. Brice. 575
Popper, James L. Treatment of Trigeminal Neuralgia: Peripheral Nerve Block. (Cur. Lit.) 1528
Porcelain Inlay Technic, Practical, for the Average Operator. William P. Smedley. 352
Practice Management
Recall System. Floyde Eddy Hogeboom. 1805
Pregnancy, Dental Disease in. James Campbell. (Cur. Lit.) 1850
Dental Problems Arising During. August F. Daro. 51
Prescribing Suggestions. (Council Dent. Ther.) 445, 616, 787, 956, 1136, 1311, 1512, 1670, 1831
President's Address. The Centennial of American Dentistry. Arthur H. Merritt. 1794
President's Message
American Dental Association, Inner Workings of the. Arthur H. Merritt. 1122
American Red Cross. Arthur H. Merritt. 1123
Cleveland, Last Call for. Arthur H. Merritt. 1494
Cleveland Meeting—September 9-13. Arthur H. Merritt. 1299
Cleveland Next: "The Centennial Year of American Dentistry." Arthur H. Merritt. 940
Dentistry's Social Responsibilities: How Are They to Be Met? Arthur H. Merritt. 618
Dues of the American Dental Association: Should They Be Increased? Arthur H. Merritt. 284
Greetings! Wilfred H. Robinson. 1817
Holiday Greetings. W. H. Robinson. 1967
On to Baltimore. Arthur H. Merritt. 449
Research Activities of the American Dental Association. Arthur H. Merritt. 776
What Is the American Dental Association Doing for Me? Arthur H. Merritt. 122
Preventive Dentistry. James Mark Prime. 1213
and "Therapeutic Odontotomy." Henry Klein and Carroll E. Palmer. 1054
Prevention, A Practical Application of the Principles of (Editorial) 270
Prime, James Mark. Preventive Dentistry. 1213
Procaine Solutions. (Council Dent. Ther.) 283, 790, 1139, 1989
and Other Drugs, Observations in the Pharmacology of. John A. Higgins. 10
with Epinephrine, Value of Potassium in Local Anesthetic Solutions of. M. L. Tainter and A. H. Throndson. 71
Process Patent Committee. (Assn. Acts.) 129
Prodinger, Wilhelm. Organic Reagents Used in Quantitative Inorganic Analysis. (Bibliog.) 1813
Prognathism, Gross, of the Upper Jaw, Improving the Mastication Efficiency and Facial Esthetics in a Case of, by Means of Oral Surgery. W. N. Brashears, W. G. Edmonds and T. E. Drewett. (Cur. Lit.) 1372
Prosthesis
Anatomic Principles as Applied to Dentistry. T. Seward. 1021
Bite-Rim Construction, Simplified. G. Sidney Jacks. (Prac. in Par.) 1533
Deformity, Congenital Oral, and Its Correction. David Beilock. 1627
Denture, Full, from the Patient's Point of View. DeForest Davis. 1715
Gnathostatic Diagnosis of "Denture Mutilations." Thomas R. Moore. 862
Preparation, Tooth, in Its Relation to Oral Physiology. B. B. McCollum. 701
Prognathism, Gross, of the Upper Jaw, Improving the Mastication Efficiency and Facial Esthetics in a Case of, by Means of Oral Surgery. T. E. Drewett, W. G. Edmonds, W. N. Brashears. (Cur. Lit.) 1372
Prosthodontia Pointer. W. H. Savage. (Prac. in Par.) 1854
Psausky, R., and K. Häupl. (Experimental Studies of Transformations in the Mandibular Joint by the Use of Functional Orthopedics of the Jaw.) (Cur. Lit.) 487
Public Health Administration of a Dental Program. Don W. Gudakunst. (Proc. Am. Public Health Assn., 1939.) 635
An Administrator Cogitates His Dental Health Program. Harold D. Chope. (Proc. Am. Public Health Assn., 1939.) 636
and Education, A Committee on. (Bur. Pub. Rel.) 1977
Baby, Coming, Building Sound Teeth for. Committee on Community Dental Service. (Bibliog.) 1309
Billy Forget-Me-Not. Maude M. Tanner. (Bibliog.) 608
Caries, Insurance of Children Against. Henry C. Sandler. (Bur. Pub. Rel.) 460

Children's Dentistry, Manual of Reference for. Dental Committee of the Health Council, Community Chest of San Francisco. (Bibliog.) 1120
Children's Dentistry, Rapport of Public Health Officials, Physicians and Dentists in. Kenneth R. Gibson. (Bur. Pub. Rel.) 1821
Dentistry in Public Health Planning. Harry Strusser. (Proc. Amer. Public Health Assn., 1939.) 641
Education, Dental Health, Needs. Lon W. Morrey. 1623
Education to Improve Dental Conditions. J. M. Wisan. (Proc. Amer. Public Health Assn., 1939.) 634
Federal Security Administration Report on Dental Research Bill (S. 3607). (Assn. Acts.) 1312
Guggenheim Clinic To Extend Its Service. (Assn. Acts.) 1325
Hagerstown, Md., Dental Needs of Grade School Children of. John W. Knutson, Henry Klein and Carroll E. Palmer. 579
Health Capacity, Dental: Its Evaluation and Prediction. Arthur L. Jensen. 1003
Indian Dental Service. Raymond Mundt and Harvey E. McDowell. (Cur. Lit.) 1164
Kansas, How Dentistry Contacts the Public in. Fred A. Richmond. (Bur. Pub. Rel.) 1978
Massachusetts Institute of Technology Offers Summer Courses in Public Health. (Bur. Pub. Rel.) 295
Mentally Ill Patients, Dentistry for the. Ralph F. Huber. (Bur. Pub. Rel.) 1129
Milwaukee Health Department, Dental Activities of. Lester A. Gerlach. (Bur. Pub. Rel.) 1825
Missouri Plan. Paul F. O'Brien. (Econ.) 1317
New York City Welfare, Department of, and Professional Care. (Bur. Pub. Rel.) 1131
Norway, School Dental Service in. Johs. Goli. (Bur. Pub. Rel.) 941
Nurses, Public Health, Short Courses in Dental Health for. Vern D. Irwin. (Proc. Amer. Public Health Assn., 1939.) 635
Organizations, Dental Health, in State Departments of Health in the United States. F. C. Cady. (Cur. Lit.) 316
Orthodontics, Facts About, for Health Workers. (Bur. Pub. Rel.) 642
Palo Alto (California) Public Schools, School Dental Clinic of. Annual Report 1938-1939. E. Pearl Hannah. (Bur. Pub. Rel.) 144
Problem, Dental, in Public Health, Study of. Leon R. Kramer. (Bur. Pub. Rel.) 1301
Program, Problem of Dental Care, in the. Frank C. Cady. (Proc. Amer. Public Health Assn., 1939) 633, 1528
Program, Public, Dental Health. Richard C. Leonard. (Proc. Amer. Public Health Assn., 1939.) 637
Programs, Dental Health, Do They Improve Dental Conditions? J. F. Owen. (Econ.) 1681
Programs, Mouth Hygiene, for School Children, Survey of. (Econ.) 152
Research by Public Health Service Relating to Dental Diseases. Bill (S. 3607). (Assn. Acts.) 964
Rocky Mountain Mid-Winter Meeting, Charles G. Grover. (Bur. Pub. Rel.) 784
Rumania, Mobile Dental Units for. (Assn. Acts.) 1324
San Francisco, Community Chest of, Dental Committee of the Health Council. Manual of Reference for Children's Dentistry. (Bibliog.) 1120
Security, Health, Public Health and Dentistry. Alfred J. Asgis. (Bibliog.) 1119
Unit, Mobile, Dental, Purpose and Plans of. Texas State Department of Health. (Bur. Pub. Rel.) 945
Publicity Myth, The Great, and Its Moral. I. Franklin Miller. (Bur. Pub. Rel.) 778
Pucci, Francisco M. (The Paradentium: Its Pathology and Treatment). (Bibliog.) 1815
Pulp, Dental, Sympathetic Nerve Fibers in the Alveolar Nerves and the Nerves of. Kermit Christensen. (Cur. Lit.) 1525
Devitalizing Paste. Prescribing Suggestions. (Council Dent. Ther.) 788
Innervation of, Some Observations on the Tusks of an Indian Elephant. Harold L. Weatherford. (Cur. Lit.) 827
Involved Teeth, Bacteriologic Verification of Roentgenographic Findings in. Ralph F. Sommer and Mary Crowley. 723
Involved Tooth, Why Not Save? (Editorial) 769
"Involved Tooth, Why Not Save?" H. A. Tuckey. (Corres.) 1160
Management: A Summary. Kenneth A. Easlick. 1097
Reactions to Various Filling Materials, Investigation into. C. B. Manley. (Cur. Lit.) 2010
Treatment, Contraindications for, in Deciduous Teeth. Samuel D. Harris. 1080
Vital, Devitalization of, with Diathermy). S. S. Lindholm. (Cur. Lit.) 1849
Pulpless Teeth, Discrimination in the Status of. Clarence O. Simpson. 525
Antrum of Highmore, and Dead Teeth. J. Novitzky. (Cur. Lit.) 484
Present Status of. Louis I. Grossman. (Cur. Lit.) 1368
Rôle of the Oral Surgeon in the Determination of Mouth Infection, Including the Presence of Pulpless Teeth, in Relation to Systemic Disease. Earle H. Thomas. 258
Pulprotex—Not Acceptable for A. D. R. (Council Dent. Ther.) 443
Pusey, William A. An Unfamiliar Cause of Loss of Weight. (Cur. Lit.) 1166
Pyorrhea (See also Periodontia)
Alveolaris, Plea for the Better Understanding of. S. A. Richards. (Cur. Lit.) 1849
and Lung Abscess, Anaerobic Hemotoxin-Producing Streptococci in. Edwin J. Grace. 1481
Pineorrhea. (Council Dent. Ther.) 1139
Treatment, Simplifying of. Bernhard Gottlieb. (Cur. Lit.) 2009
Xttrium Treatment for Pyorrhea—Not Acceptable for A. D. R. (Council Dent. Ther.) 609

Q

Quinine Dermatitis from Anacin. J. Lamb (Cur. Lit.) 482

R

Radio Announcement: "Americans at Work—The Dentist" (Bur. Pub. Rel.) 475
Broadcast by Arthur H. Merritt NBC Blue Network. (Assn. Acts.) 453
Radiology (See also Roentgenology)
Diagnosis, Oral, Radiodontic Aspect of. D. W. Lovett. 421
General Practitioner, Radiodontia for. James P. Coupland. 44
Legal Aspects of Radiodontics. A. Sweet. (Cur. Lit.) 483
Pulpless Teeth, Discrimination in the Status of. Clarence O. Simpson. 525
Therapy, Radium, Application of Dental Molds to. Louis J. Levinson and Nathan Peck. (Cur. Lit.) 1688
Rathbun, Margaret, Ethel L. French, Helen Tefft, Jane Eckhardt, Eileen Welch and Harold C. Hodge. Composition of Pre-Columbian Teeth. (Cur. Lit.) 826
Rauch, Albin W. Should Unerupted Teeth Be Removed? (Incs. of Prac.) 1694
Rawlins, A. G. Osteoma of the Maxillary Sinus. (Cur. Lit.) 1851
Reagents, Organic, Used in Quantitative Inorganic Analysis. Wilhelm Prodinger. (Bibliog.) 1813
Recall System. Floyde Eddy Hogeboom. 1805
Redecker, Kurt, and Annelise Winkler. (Disinfection of Dental Instruments with Zephirol.) (Cur. Lit.) 1164
Reed, C. I., and P. S. Faillo. Effect of Ap-

plication of Vitamin D to Dentin in Dogs. (Cur. Lit.) 1852
H. C. Struck and I. E. Steck. Vitamin D: Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations. (Bibliog.) 441
Reed, Gerald J., and Warren Willman. Galvanism in the Oral Cavity. 1471
Reeves, Robert J. Roentgen Therapy of Bilateral Parotid Fistula. (Cur. Lit.) 993
Rehrauer, Walter, and Karl Van Lear Berglund. Dental Abnormalities in Recruits. (Cur. Lit.) 1165
Reimann, H. A., and W. P. Havens. Focal Infection and Systemic Disease: A Critical Appraisal. (Cur. Lit.) 825
Reiss, Oscar, and Elena Boder. Congenital Cranial Osteoporosis: Its Etiology and Significance. A Study of Eight Hundred New-Born Infants. (Cur. Lit.) 1368
Reitan, Kaare (Some Mechanical and Histologic Problems Connected with Rotation of Teeth.) (Cur. Lit.) 1369
and William J. Skillen. Tissue Changes Following Rotation of Teeth in the Dog. (Cur. Lit.) 1849
Relief Fund, Dental. (Assn. Acts.) 130
Research Activities of the American Dental Association. President's Message. Arthur H. Merritt. 776
American Dental Association Specification No. 3 for Dental Impression Compounds: First Revision—1939. W. T. Sweeney and John R. Beall. 713
Bill, Dental, (S. 3607), Federal Security Administration Report on. (Assn. Acts.) 1312
Bill, Dental, S. 3607. National Health Program Committee. (Assn. Acts.) 1844
Certified Inlay Casting Waxes, Survey of. (Res. Com.) 451
Commission of the American Dental Association, Midyear Report of. (Assn. Acts.) 620
Cooperation in. Thomas E. Moore. 400
Dental, Bill to Provide $75,000 for, by Public Health Service Is Introduced into Congress of the United States. (Assn. Acts.) 629
Dental, Laboratory Facilities for, in Basic Sciences at the University of Minnesota. Peter J. Brekhus. 358
Fevers, Effect of, on the Development of the Rat Incisors. Leland H. Garrison. (Cur. Lit.) 1527
Hydrocolloidal Impression Materials: Physical Properties and a Specification. George C. Paffenbarger. 373
in Dentistry; Its Importance in Dental Education. Hamilton B. G. Robinson. 918
Resorption, Internal: Report of a Case. J. C. Eselman. (Incs. of Prac.) 657
Retruded Chins: Correction by Plastic Operation. Gordon B. New and John B. Erich. (Cur. Lit.) 1528
Richards, S. A. Plea for the Better Understanding of Pyorrhea Alveolaris, (Cur. Lit.) 1849
Richison, Frank A. Fractures of the Maxilla. 558
Treatment of Malar and Zygomatic Fractures. (Cur. Lit.) 484
Richman, Samuel. Spontaneous Amputation of the Tongue: Case Report. (Cur. Lit.) 1368
Richmond, Fred A. How Dentistry Contacts the Public in Kansas. (Bur. Pub. Rel.) 1978
Richter, C. P., and K. H. Campbell. Taste Threshold and Taste Preferences of Rats for Five Common Sugars. (Cur. Lit.) 1529
Rickets, and Cereals. X. Availability of Phytic Acid Phosphorus. C. H. Krieger, R. Bunkfeldt and H. Steenbock. (Cur. Lit.) 1691
and Cereals. XI. Calcium Phytate as a Source of Calcium. C. H. Krieger, R. Bunkfeldt and H. Steenbock. (Cur. Lit.) 2008
and Cereals: XII. Effect of Calcium and Vitamin D on the Availability of Phosphorus. C. H. Krieger and Hans Steenbock. (Cur. Lit.) 2008
Healing of, Fat as a Factor in. A. Knudson and R. T. Floody. (Cur. Lit.) 2011
Production of, Comparison of Cereal and Non-Cereal Diets in. J. Jones. (Cur. Lit.) 160
Riethmuller, Richard H. War Oral Surgery. 894
Rigg, J. P., and R. Waldapfel. Lymphangioma of the Tongue. (Cur. Lit.) 1371
Riggall, Charles W., Jr. "Abscesses"; Ten-Fifteen Year "Cures." 361
Rights, F., Theodor Rosebury and Genevieve Foley. Effects of Neoarsphenamine and Sulpharsphenamine on Experimental Fusospirochetal Infection in Guinea Pigs. (Cur. Lit.) 216
Robbin, G., and K. Lewis. Fermentation of Sugar Acids. (Cur. Lit.) 482
Robbins, R. H. Cyclopropane Anesthesia. (Bibliog.) 1654
Robbins, Ruth C., and E. Neige Todhunter. Observations on the Amount of Ascorbic Acid Required to Maintain Tissue Saturation in Normal Adults. (Cur. Lit.) 994
Robinson, A. L., J. O. French, M. L. Hooker and R. B. Vanse. Dental Anesthesia in Children. Comparison of Vinyl Ether and Ethyl Chloride in a Series of 200 Cases. (Cur. Lit.) 992
Robinson, Hamilton B. G. Research in Dentistry: Its Importance in Dental Education. 918
Robinson, Wilfred H. Greetings! President's Message. 1817
Holiday Greetings. President's Page, 1967
Roentgenology (See also Radiology)
Dental. LeRoy M. Ennis. (Bibliog.) 442
Dental, Clinical. John Oppie McCall and Samuel Stanley Wald. (Bibliog.) 1118
Diagnosis, Roentgen, of Cancer of the Accessory Sinuses. G. E. Pfahler and J. H. Vastine, 2d. (Cur. Lit.) 1692
Diagnosis, Roentgenographic. Milton B. Asbell. (Incs. of Prac.) 1530
Pigmentation of the Face Following X-Ray Examination of the Jaw. Oscar L. Levin and Howard T. Behrman. 1599
Pulp Involved Teeth, Roentgenographic Findings in Bacteriologic Verification of. Ralph F. Sommer and Mary Crowley. 723
Root Resection, Verification of Results of, by Photomicrographs. Obed H. Moen. 1071
Surgery and Roentgenography. Matthew Lozier. (Incs. of Prac.) 325
Rollert, F. Occurrence of Lingua Plicata (Folded Tongue). (Cur. Lit.) 158
Rolleston, C. Observations on 1,136 Cases of Enlarged Tonsils and Adenoids. (Cur. Lit.) 320
Root Canals
"Abscesses"; Ten-Fifteen Year "Cures." Charles W. Riggall, Jr. 361
Bone Regeneration Following Conservative Root Canal Treatment. J. A. Englander. 1733
Enlarging, Safe and Quick Method for, for Post Reception Following Regular Root Canal Treatment. I. Gerson. (Prac. in Par.) 1534
Infected, Treatment of, Methods of Testing for Bacterial Growth During. Edgar D. Coolidge. 25
Root Resection, Verification of Results of, by Photomicrographs. Obed H. Moen. 1071
Root Resorption Occurring During Orthodontic Treatment. Evaluation of. Charles R. Rudolph. (Cur. Lit.) 1849
Therapy. Louis I. Grossman. (Bibliog.) 608
Roper-Hall, H. T., and A. P. Bertwistle. Tender Teeth: Their Gingival Importance. (Cur. Lit.) 1852
Rose, W. Vincent's Infection. (Cur. Lit.) 219
Rosebury, Theodor, Genevieve Foley and F. Rights. Effects of Neoarsphenamine and Sulpharsphenamine on Experimental

Fusospirochetal Infection in Guinea Pigs. (Cur. Lit.) 316
Rosenbusch, C. T., and A. M. Lucas. Studies on the Pathogenicity and Cytological Reactions of the Submaxillary Gland Virus of the Guinea-Pig. (Cur. Lit.) 159
Rosin. (Council Dent. Ther.) 790
Roth, Harry, and Samuel Charles Miller. Torus Palatinus: A Statistical Study. 1950
Rudolph, Charles R. Evaluation of Root Resorption Occurring During Orthodontic Treatment. (Cur. Lit.) 1849
Rumania, Mobile Dental Units for. (Assn. Acts.) 1324
Rushton, M. A. Observations on Fish's "Dead Tract" in Dentine. (Cur. Lit.) 1371
Ruspa, F. (Vitamin C Deficiency in Relation to Paradental and Carious Lesions). (Cur. Lit.) 1526
Ruth, W. A., Margaret Lawrenz and H. H. Mitchell. Adaptation of Growing Rat to the Ingestion of a Constant Concentration of Fluorine in the Diet. (Cur. Lit.) 1372
Rutledge, C. E. Oral and Roentgenographic Aspects of the Teeth and Jaws of Juvenile Diabetics. 1740

S

Sachs, Maurice D. Metastases from Carcinoma of the Tongue. (Cur. Lit.) 1168
Saleeby, George W. Cancer of the Tongue in Young Subjects. (Cur. Lit.) 1168
Saliva: A Short Account of a Property Previously Undescribed. Paul Pincus. (Cur. Lit.) 828
(Amylase, Salivary, A Contribution to Our Knowledge of.) H. Ninomiya. (Cur. Lit.) 1168
Dietary Effects upon the Acid Neutralizing Power of. J. H. Wills and J. C. Forbes. (Cur. Lit.) 486
Factors in, Correlated with Dental Caries. Maxwell Karshan. (Cur. Lit.) 159
Human. VII, VIII. A Study of Rate of Flow of Resting Saliva. Hermann Becks. (Cur. Lit.) 158
Human. IX. Effect of Activation on Salivary Flow. Hermann Becks and W. W. Wainwright. (Cur. Lit.) 158
Hydrogen-Ion Concentration, Changes in, on Tooth Surfaces and in Carious Lesions. Robert M. Stephan. 718
Lactobacilli in, Simple Colorimetric Method for Estimation of Relative Numbers of. M. L. Snyder. (Cur. Lit.) 1852
M. & B 693 in. B. Fickling, Paul Pincus and B. Boyd-Cooper. (Cur. Lit.) 653
of Eskimos, Biochemical Studies of. Maxwell Karshan, Eli H. Siegel and Leuman M. Waugh. (Cur. Lit.) 653
of Selected Caries-Free Children, Occurrence of Lactobacilli and Other Acidogenic Organisms in. Marshall L. Snyder. (Cur. Lit.) 650
Salivary Glands, Extirpation of, Development of Caries in the Teeth of Albino Rats Following. David Weisberger, C. Truman Nelson and Paul E. Boyle. (Cur. Lit.) 654
Extirpation, Selective, Effects of, upon Experimental Dental Caries in the Rat. V. D. Cheyne. (Cur. Lit.) 319
of the Rat, Description of, and a Procedure for Their Extirpation. Virgil D. Cheyne. (Cur. Lit.) 486
Tumors, Mixed, of, Pathogenesis and Radium Therapy of. I. Levin. (Cur. Lit.) 650
Type, Mixed Tumors of, Seen in the Pharynx. C. Fox. (Cur. Lit.) 484
Salmon, Theodora N., Daniel E. Ziskin and Edmund Applebaum. Effect of Thyroparathyroidectomy at Birth and at Seven Days on Dental and Skeletal Development of Rats. (Cur. Lit.) 1167
Salzmann, J. A. Aiding Your Child to Face the World. (Bur. Pub. Rel.) 1983
San Francisco, Community Chest of, Dental Committee of the Health Council. Manual of Reference for Children's Dentistry. (Bibliog.) 1120
Sandler, Henry C. Insurance of Children Against Caries. (Bur. Pub. Rel.) 460
Savage, W. H. A Prosthodontia Pointer. (Prac. in Par.) 1854
Schantz, C. W. Elimination of Oral Sepsis. (Cur. Lit.) 1165
Schlack, Carl A. Dental Caries: Prevalence Experience at Initial Examinations and Incidence of New Carious Lesions After a One-Year Interval in 1,047 Officers and Enlisted Men of the United States Navy. (Cur. Lit.) 651
Etiology of Enamel Spindles in Human Teeth. (Cur. Lit.) 1527
Schlosser, Rudolph O. A Study in Ethics and Economics Pertaining to the Field of Complete Denture Prosthesis. 1222
Schneider, M. Unusual Anatomic Markings in the Mandible. (Incs. of Prac.) 1531
Schour, Isaac, and M. Massler. Studies in Tooth Development: The Growth Pattern of Human Teeth. Part I. 1778; Part II. 1918.
Schriever, William, Everett S. Lain and G. Sherrill Caughron. Problem of Electrogalvanism in the Oral Cavity Caused by Dissimilar Dental Metals. 1765
Schuck, Cecilia. Study of the Relative Toxicity of Sodium Fluoride in a Dry Diet in Milk and in Water. (Cur. Lit.) 651
Schultz, Chester J. Economics Survey of Greater Cleveland and Northeastern Ohio. (Econ.) 973
Sedatives. Prescribing Suggestions. (Council Dent. Ther.) 616
Seltzer, Samuel. Bacteriologic Status of the Dentin After Cavity Preparation. 1799
Sepsis, Dental, Relationship of, to Systemic Disease. Louie T. Austin. 684
Oral, Elimination of. C. W. Schantz. (Cur. Lit.) 1165
Seward, T. Anatomic Principles as Applied to Dentistry. 1021
Shaffer, O. J. Suppurating Dentigerous Cyst. (Incs. of Prac.) 988
Shanahan, Thomas E. J. Centric and Eccentric Occlusion in Full Dentures, with the Mandibulograph. 708
Shapiro, Edward, and H. D. Coles. Dendritic Keratitis Caused by Abscessed Teeth. 1205
Sharenson, Reuben. Injury to Deciduous Teeth. (Incs. of Prac.) 328
Sharnoff, J. G., and J. R. Lisa. Adenocarcinoma Arising from the Mucous Glands of the Palate with Pulmonary Metastases (Case Report). (Cur. Lit.) 653
Shea, William E. Treatment of Dry Socket: A Preliminary Report. 1482
Shearer, William L. Cleft-Palate and Cleft-Lip. 601
Shell, John S. Stiffness Characteristics and Bending Tests as Applied to Dental Materials. 232
Siegel, Eli H., Maxwell Karshan, and Leuman M. Waugh. Biochemical Studies of the Saliva of Eskimos. (Cur. Lit.) 653
Leuman M. Waugh and Maxwell Karshan. Dietary and Metabolic Studies of Eskimo Children with and Without Dental Caries. (Cur. Lit.) 653
Siegel, Martin T. Supernumerary Tooth. (Incs. of Prac.) 655
Sigtenhorst, Howard C. A Simple Method of Restoring Relationship in Warped Partial Dentures. (Incs. of Prac.) 488
Silicate Cement: An Investigation by a Group of Practicing Dentists Under the Direction of the A.D.A. Research Fellowship at the National Bureau of Standards. George C. Paffenbarger. 1611
Cements, Certified. (A.D.A. Specification.) (Res. Com.) 795
Protecting. Calvin William Knowles. (Prac. in Par.) 985
Silicosis: A Potential Hazard in Dental Laboratories. Leon R. Kramer. (Bur. Pub. Rel.) 1503
Silver Nitrate, Ammoniacal. Prescribing Suggestions. (Council Dent. Ther.) 448
Applicator. (Prac. in Par.) 156

Silverman, Meyer M. The Electrocautery. (Prac. in Par.) 1533
Simon, Clarence T. What Rôle Can the Dentist Play in the Prevention or Correction of Speech Defects? 899
Simpson, Clarence O. Discrimination in the Status of Pulpless Teeth. 525
Sinus Drainage, Susceptibility to Colds Cured by, After Extraction of Molar. Precioso B. Villareal. (Incs. of Prac.) 328
Osteoma of Maxillary. A. G. Rawlins. (Cur. Lit.) 1851
Sinuses, Cancer of Accessory, Roentgen Diagnosis of. G. E. Pfahler and J. H. Vastine, 2d. (Cur. Lit.) 1692
Sinusitis, Maxillary, and Obscured Partial Impaction as Causes of Dental Pain of Undetermined Origin. Joseph D. Berke. 57
Skillen, William G. Tissue Changes the Result of Artificial Stimuli and Injury. 1554
and Kaare Reitan. Tissue Changes Following Rotation of Teeth in the Dog. (Cur. Lit.) 1849
Skinner, Eugene W. The Science of Dental Materials. (Bibliog.) 1815
Skoblow, M. Gagging. (Prac. in Par.) 1533
Smedley, William P. Practical Porcelain Inlay Technic for the Average Operator. 352
Smith, Arthur E., and James B. Johnson. Surgical Treatment of Mandibular Deformations. 689
Smith, Charles H., and Herbert B. Johnson. Treatment of Acute Stomatitis. (Cur. Lit.) 1529
Smith, H. V., and Margaret C. Smith. Observations on the Durability of Mottled Teeth. (Cur. Lit.) 2011
Smith, J. W., H. C. Gotshalk and C. F. Tessmer. Malignant Melanoma of the Palate. (Cur. Lit.) 2012
Smith, Margaret C., and H. V. Smith. Observations on the Durability of Mottled Teeth. (Cur. Lit.) 2011
Smith, T. Sydney. Anatomic and Physiologic Conditions Governing the Use of the Toothbrush. 874
Snyder, Marshall L. Occurrence of Lactobacilli and Other Acidogenic Organisms in the Saliva of Selected Caries-Free Children. (Cur. Lit.) 650
Simple Colorimetric Method of Estimation of Relative Numbers of Lactobacilli in the Saliva. (Cur. Lit.) 1852
Soap, Liquid. Prescribing Suggestions. (Council Dent. Ther.) 1832
Sodium Ethyl (1-Methybutyl) Thiobarbituric Acid, Intravenous Anesthesia for Dental Surgery with. Adrian O. Hubbell and R. Charles Adams. 1186
Sodium Perborate, Flavored. Prescribing Suggestions. (Council Dent. Ther.) 958
Sognnaes, Reidar F. Importance of a Detailed Clinical Examination of Carious Lesions. (Cur. Lit.) 993
and Ruth L. White. Oral Conditions of Children in Relation to State of General Health and Habits of Life. (Cur. Lit.) 1689
Sommer, Ralph F., and Mary Crowley. Bacteriologic Verification of Roentgenographic Findings in Pulp Involved Teeth. 723
Sorbitol Syrup. (Council Dent. Ther.) 959
Sorrin, Sidney. Chronic Desquamative Gingivitis. 250
Space Maintainers, Contraindications for, in the Mouths of Children. George S. Callaway. 1091
Space Retention with Fixed Compensating Bridges. Leonard Kohn. 1086
Spaulding, E. H. Studies on Chemical Sterilization of Surgical Instruments. 1. A Bacteriological Evaluation. (Cur. Lit.) 160
Speech Defects, Prevention or Correction of, What Rôle Can the Dentist Play in? Clarence T. Simon. 899
Rehabilitation Following Excision of the Tip of the Tongue. Ollie Bachus. (Cur. Lit.) 1689
Speidel, I. D., and Genevieve Stearns. Relation of Vitamin D Intake to the Age of the Infant at the Time of Eruption of the First Deciduous Incisor. (Cur. Lit.) 2010
Spencer, F. R., C. F. Hagner and W. C. Block. Benign and Malignant Tumors of the Jaw. (Cur. Lit.) 1688
Splints
Rhinoplastic Surgical Procedure, Dental Molding, Compound Cast and Adhesive Strapping in. Gustave Anfricht. (Cur. Lit.) 1688
St. Apollonia, Patron Saint of Dentistry. (Photograph) 296
Starke, A. C., Jr., and L. S. Fosdick. Solubility of Tooth Enamel in Saliva at Various pH Levels. (Cur. Lit.) 162
Steadman, Sherwood R. Overbites. (Cur. Lit.) 1853
Six Different Kinds of Overbites. 1060
Stearns, Genevieve, and I. D. Speidel. Relation of Vitamin D Intake to the Age of the Infant at the Time of Eruption of the First Deciduous Incisor. (Cur. Lit.) 2010
Steck, I. E., C. I. Reed and H. C. Struck. Vitamin D: Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations. (Bibliog.) 441
Steckman, F. D. Aid in Deflasking Partial Plates When Acrylic Resins Are Used. (Prac. in Par.) 321
Pouring Lower Full Denture Impressions. (Prac. in Par.) 321
Stedman, Thomas Lathrop. Stedman's Medical Dictionary. (Bibliog.) 275
Steenbock, Hans, and C. H. Krieger. Cereals and Rickets: XII. Effect of Calcium and Vitamin D on the Availability of Phosphorus. (Cur. Lit.) 2008
C. H. Krieger and R. Bunkfeldt. Cereals and Rickets. X. Availability of Phytic Acid Phosphorus. (Cur. Lit.) 1691
C. H. Krieger and R. Bunkfeldt. Cereals and Rickets. XI. Calcium Phytate as a Source of Calcium. (Cur. Lit.) 2008
Steggerda, Morris. Physical Measurements on Negro, Navajo and White Girls of College Age. (Cur. Lit.) 1164
Stephan, Robert M. Changes in Hydrogen-Ion Concentration on Tooth Surfaces and in Carious Lesions. 718
Stephen, C., and H. Irish. Hyperpyrexia Following Operation for Cleft Lip or Palate. (Cur. Lit.) 161
Sterilization of Surgical Instruments, Studies on. 1. Bacteriological Evaluation. E. H. Spaulding. (Cur. Lit.) 160
(Disinfection of Dental Instruments with Zephirol.) Annelise Winkler and Kurt Redecker. (Cur. Lit.) 1164
of Surgical and Dental Instruments, Antibacterial Effects of the Organic Mercurial Compounds with Special Reference to Their Use as Germicides for. John H. Brewer. (Council Dent. Ther.) 276
Resterilization of Dental Instruments by the Use of Alcohol and Flaming. Louis I. Grossman and J. L. T. Appleton. 1632
Still, J. L., H. R. Sullivan and N. E. Goldsworthy. Acid-Production as a Basis for Classifying Lactobacilli from Carious Teeth. (Cur. Lit.) 651
Stillson, William C. Cleveland. (Assn. Acts.) 802
Stimulant in Fainting, Prescribing Suggestions. (Council Dent. Ther.) 1832
Stomatitis, Acute, Treatment of. Charles H. Smith and Herbert B. Johnson. (Cur. Lit.) 1529
Noma, Rôle of Anaerobic Bacteria in. Clinical and Experimental Observations. A. Heller and T. Mednedeva. (Cur. Lit.) 318
of Dietary Origin. W. R. Aykroyd, B. G. Krishnan and R. Passmore. (Cur. Lit.) 485
Stone, Harry and, Max H. Jacobs. Cysts of the Jaws. (Cur. Lit.) 1528
Stout, R. A. Gunshot Wounds of the Face

and Jaws: First Aid Treatment, Field Service. (Cur. Lit.) 1690
Strabismus of Dental Source. Meyer Cohen. (Incs. of Prac.) 1530
Streptococci, Anaerobic Hemotoxin-Producing, in Pyorrhea and Lung Abscess. Edwin J. Grace. 1481
Streptococcus, Rôle of, in Some Dental Infections: A Study of Residual Areas. Iva C. Youmans and Laura M. Hobbs. (Cur. Lit.) 2012
Streptococcus Viridans, Artificial Caries Produced by. Carolyn Hammond and Ruth Tunnicliff. (Cur. Lit.) 992
Bacteremia Following Extraction of Teeth. H. D. Palmer and Myrna Kempf. (Cur. Lit.) 654
Struck, H. C., C. I. Reed and I. E. Steck. Vitamin D: Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations. (Bibliog.) 441
Strusser, Harry. Dentistry in Public Health Planning. (Proc. Am. Public Health Assn., 1939.) 641
Stuart, Carroll W. Deep Infections of the Head and Neck. 922
Students, Dental, Proposed Association of. (Assn. Acts.) 630
Styptics. Prescribing Suggestions. (Council Dent. Ther.) 1311
Sugar Is a Significant Factor in Dental Caries, Has It Been Proved That? Florence B. Hopkins. 1801; Louis M. Fleisch. (Corres.) 2006
Sugarbaker, E. L., and H. E. Martin. Cancer of the Mouth. (Cur. Lit.) 1691
Sulfanilamide and Guaiacol Glycerine Solution, Use of. R. J. De Wolf. (Incs. of Prac.) 324
Dental Uses of. Ralph W. Edwards. 1394
Toxic Effects of. Gilbert J. Levy. (Cur. Lit.) 827
Use of. Paul O. Hageman. 909
Use of, in the Average Extraction Case, A Preliminary Report on. Avery S. Krashen. 1199
Sullivan, H. R. Comparison of the Decalcifying Ability of Different Strains of Oral Lactobacilli. (Cur. Lit.) 650
J. L. Still and N. E. Goldsworthy. Acid-Production as a Basis for Classifying Lactobacilli from Carious Teeth. (Cur. Lit.) 651
Sulpharsphenamine, and Neoarsphenamine, Effects of, on Experimental Fusospirochetal Infection in Guinea Pigs. Theodor Rosebury, Genevieve Foley and F. Rights. (Cur. Lit.) 316
Supernumerary, and Impacted Teeth with Cyst: Report of a Case. S. L. Elliott. (Incs. of Prac.) 987
and Missing Teeth in Wild Mammals of the Orders Insectivora and Carnivora, with Some Notes on Disease. E. Raymond Hall. (Cur. Lit.) 1525
Incisors, Upper Central, Erupting, Three Sets of. M. H. Bernards. (Incs. of Prac.) 987
Teeth. J. R. Horn. (Incs. of Prac.) 1694; John M. Marré. 212
Tooth. Martin T. Siegel. (Incs. of Prac.) 655
Surgery, and Roentgenography. Matthew Lozier. (Incs. of Prac.) 325
of Injury and Plastic Repair. Samuel Fomon. (Bibliog.) 440
Principles of, Synopsis of. Jacob K. Berman. (Bibliog.) 1813
Surveyor, Paralleling, Use of, in Modern Partial Denture Construction. Oliver C. Applegate. 1397
Suture Material, Catgut, Silk, Linen and Cotton, Relative Value of, as. (Cur. Lit.) 1368
Svoboda, F. J. Technic for Constructing Vulcanite Impression Trays, Emergency Partial Dentures and Removable Orthodontic Vulcanite Appliances. (Prac. in Par.) 321
Swanson, W. F., C. G. King and R. R. Musulin. Effects of Vitamin C Intake upon the Degree of Tooth Injury Produced by Diphtheria Toxin. (Cur. Lit.) 2011
Sweeney, James T. Amalgam Manipulation: Manual Vs. Mechanical Aids. Part II. Comparison of Clinical Applications. 1940
Significance of the Bismuth Line in the Mouth. (Incs. of Prac.) 986
Uncontrolled Variables in Amalgam, with Significant Improvements in the Making of Restorations. 190
Sweeney, W. T., and John R. Beall. American Dental Association Specification No. 8 for Dental Impression Compounds: First Revision—1939. 713
and H. J. Caul. Denture Rubber: Composition, Properties and a Specification. 1446
Sweet, A. Legal Aspects of Radiodontics. (Cur. Lit.) 483
Sweet, Charles A. Are Teeth Insurable? 215
Swellings, Acute Inflammatory, of the Face and Neck, Differential Diagnosis of. J. H. Maxwell. 1243
Swenson, Merrill G. Complete Dentures. (Bibliog.) 1964
Syphilis—Dentist's Contact with It. Trim Houston. 603
of the Mouth, Diagnosis of. Ewell I. Thompson. (Cur. Lit.) 1853
Serologic Tests, Original, for, Announcement of a Study to Evaluate. (Assn. Acts.) 1326
Systemic Disease, and Focal Infection: A Critical Appraisal. H. A. Reimann and W. P. Havens. (Cur. Lit.) 825
Dental Sepsis, Relationship of, to. Louie T. Austin. 684
Oral Conditions of Children in Relation to State of General Health and Habits of Life. Reidar F. Sognnaes and Ruth L. White. (Cur. Lit.) 1689
Oral Infection and Gastro-Intestinal Disease. Karl A. Meyer. 93
Szokoloczy-Syllaba, Béla. Measurements of the Ascending Ramus of the Mandible. (Cur. Lit.) 650

T

Tainter, M. L., and A. H. Throndson. Value of Potassium in Local Anesthetic Solutions of Procaine with Epinephrine. 71
Talbot's Solution. Prescribing Suggestions. (Council Dent. Ther.) 1311
Tanner, Maude M. Billy Forget-Me-Not. (Bibliog.) 608
Tassman, G. C., and I. B. Bender. Gaucher's Disease: Report of a Case. 1268
Taylor, G. F., and C. D. M. Day. Osteomalacia and Dental Caries. (Cur. Lit.) 1850
Taylor, P. B. Factors in Porosity in Vulcanite. 564
Technician, Dental, Dentist and the Public. Walter H. Wright. 1932
Technologists, Medical. American Red Cross. (Assn. Acts.) 631
Teeth, Are They Insurable? Charles A. Sweet. 215
Deciduous, Injury to. Reuben Sharenson. (Incs. of Prac.) 328
Health and Appearance. American Dental Association. (Bibliog.) 473, 1119
Incisor, Central, Fractured. K. R. Durham. (Incs. of Prac.) 987
Infected, Non-Vital, Should They Be Removed? (Incs. of Prac.) 986
Injuries, Traumatic, in the Jaws of Infants. Joseph Weinmann and Rudolf Kronfeld. (Cur. Lit.) 1850
of Dogs, Histologic Response of, to Operative Procedures. W. B. Gurley and Grant Van Huysen. (Cur. Lit.) 1852
Precolumbian, Composition of. Ethel L. French, Helen Tefft, Margaret Rathbun, Jane Eckhardt, Eileen Welch and Harold C. Hodge. (Cur. Lit.) 826
Pregnancy, Dental Disease in. James Campbell. (Cur. Lit.) 1850
(Rotation of, Some Mechanical and Histologic Problems Connected with.) K. Reitan. (Cur. Lit.) 1369
Solvent Action of Various Substances on: A Quantitative Determination. John W.

Trask, Edwin E. Ziegler and Edward C. Maloof. 1013
Stimulation, Noxious, and Pressure, Afferent Impulses from the Teeth Due to. Carl Pfaffmann. (Cur. Lit.) 652
Tender: Their Gingival Importance. H. T. Roper-Hall and A. P. Bertwistle. (Cur. Lit.) 1852
Three Sets of Erupting Upper Central Incisors. M. H. Bernards. (Incs. of Prac.) 987
Wandering and Elongation of, and Pocket Formation in Parodontosis. Kurt H. Thoma and Henry M. Goldman. 335
Zinc, Natural Occurrence of, in. D. B. Cruikshank. (Cur. Lit.) 1165
Tefft, Helen, Ethel L. French, Margaret Rathbun, Jane Eckhardt, Eileen Welch and Harold C. Hodge. Composition of Precolumbian Teeth. (Cur. Lit.) 826
Temporomandibular Joint, Some Controversies Over the. L. B. Higley. 594
Tench, Russell W. Tradition and Its Effect on Progress in Full Denture Prosthesis. 762
Tessmer, C. F., H. C. Gotshalk and J. W. Smith. Malignant Melanoma of the Palate. (Cur. Lit.) 2012
Tetrault, P. A., W. A. Bittenbender, E. F. Degering, C. F. Feasley and B. H. Gwynn. Bactericidal Properties of Commercial Antiseptics. (Cur. Lit.) 1528
Teuscher, George W. Suggestions for the Treatment of Abnormal Mouth Habits. 1703
Texas State Department of Health. Purpose and Plans of Mobile Dental Unit. (Bur. Pub. Rel.) 945
Theilemann, Konrad. Biomechanik der Paradentose. (Bibliog.) 1119
Thewlis, J. Submicroscopic Structure of Dental Enamel. (Cur. Lit.) 654
Thoma, Kurt H., and Henry M. Goldman. Wandering and Elongation of the Teeth, and Pocket Formation in Parodontosis. 335
Thomas, A. L. Review of the Orthodontia Problem. 1751
Thomas, Bernard O. A. A Histologic Study and Comparison of the Pulps of Embedded and Erupted Third Molar Teeth. 886
Thomas, Earle H. Rôle of the Oral Surgeon in the Determination of Mouth Infection, Including the Presence of Pulpless Teeth, in Relation to Systemic Disease. 258
Thompson, Ewell I. Diagnosis of Syphilis of the Mouth. (Cur. Lit.) 1853
Thrombosis, Cavernous Sinus, Resulting from a Mandibular Alveolar Abscess of a Deciduous Molar: Report of a Case. Harvard D. Jacobs. 1641
Throndson, A. H., and M. L. Tainter. Value of Potassium in Local Anesthetic Solutions of Procaine with Epinephrine. 71
Thumb and Finger Sucking in Childhood. W. S. Langford. (Cur. Lit.) 319
Treatment of Abnormal Mouth Habits, Suggestions for. George W. Teuscher. 1703
Thyroparathyroidectomy at Birth and at Seven Days, Effect of, on Dental and Skeletal Development of Rats. Daniel E. Ziskin, Theodora N. Salmon and Edmund Applebaum. (Cur. Lit.) 1167
Tic Douloureux: Etiology, Accurate Diagnosis and Treatment by the Use of Typhoid Vaccine. T. A. Hardgrove. 507
Relief of Symptoms of Major Trigeminal Neuralgia. H. Bersook, M. Y. Kremers and C. W. Wiggins. (Cur. Lit.) 1693
Treatment of Trigeminal Neuralgia: Peripheral Nerve Block. James L. Popper. (Cur. Lit.) 1528
Tiltmeter
Dentures, Displacement of Tissues Under, Studies of. Carl O. Boucher. 1476
Tipton, Dorsey R. Suture in Hemorrhage. (Prac. of Par.) 321
Todhunter, E. Neige, and Ruth C. Robbins. Observations on the Amount of Ascorbic Acid Required to Maintain Tissue Saturation in Normal Adults. (Cur. Lit.) 994
Tomb, J. Walker. Treatment of Black Hairy Tongue. (Cur. Lit.) 1371
Tomlinson, T. H., Jr., Oral Pathology (Pathosis in Monkeys in Various Experimental Dietary Deficiencies. (Cur. Lit.) 158
Tongue, Amputation, Spontaneous, of: Case Report. Samuel Richman. (Cur. Lit.) 1368
Black Hairy: Report of Three Cases. Charles Barrett Kennedy and James K. Howles. (Cur. Lit.) 2012
Black Hairy, Treatment of. J. Walker Tomb. (Cur. Lit.) 1371
Burning. A. L. Borish. (Incs. of Prac.) 657
Cancer of, in Young Subjects. George W. Saleeby. (Cur. Lit.) 1168
Cancer of, Surgical Treatment of. Leland R. Cowan. (Cur. Lit.) 992
Carcinoma of, Metastases from. Maurice D. Sachs. (Cur. Lit.) 1168
([Folded], Lingua Plicata, Occurrence of.) F. Rolleri. (Cur. Lit.) 158
Lymphangioma of. J. P. Rigg and R. Waldapfel. (Cur. Lit.) 1371
(Plasmocytoma of.) G. Milian. (Cur. Lit.) 317
"Tongue-Tie" in Infants. (Cur. Lit.) 487
Tonsils and Adenoids, Enlarged, Observations on 1,136 Cases of. C. Rolleston. (Cur. Lit.) 320
Tooth and Bone Development, Relations of Endogenous and Exogenous Factors in: Teeth of the Grey-Lethal Mouse. Hans Grünburg. (Cur. Lit.) 1853
Brushing Technics. Stanley M. Gower. (Incs. of Prac.) 655
Development, Studies in: The Growth Pattern of Human Teeth. Isaac Schour and M. Massler. Part I. 1778; Part II. 1918
Form. Drawing and Carving: A Manual. Russell C. Wheeler. (Bibliog.) 442
Fused Cuspid and Bicuspid. Irving S. Vogel. (Incs. of Prac.) 488
Fusion. Ralph Cherniak. (Incs. of Prac.) 989
Fusion. C. J. Kirwan. (Incs. of Prac.) 1532
Fusion. Matthew Pommer. (Incs. of Prac.) 1695
Mutilation, Types of, Found in Mexico. D. F. Rubin De La Borbolla. (Cur. Lit.) 1167
Toothbrush, Use of, Anatomic and Physiologic Conditions Governing. T. Sydney Smith. 874
Torus Palatinus: A Statistical Study. Samuel Charles Miller and Harry Roth. 1950
Tosca, Henri A. Closed Bite Causing Incessant Swallowing and Throat Distress. (Incs. of Prac.) 1531
Toverud, Guttorm. (Extraction of the First Permanent Molar During Childhood.) (Cur. Lit.) 993
Toxicology
Poison Trail. William F. Boos. (Bibliog.) 1297
Trask, John W., Edwin E. Ziegler and Edward C. Maloof. Solvent Action of Various Substances on Teeth: A Quantitative Determination. 1013
Tratman, E. K. Compound Composite Odontome. (Cur. Lit.) 1529
Trench Mouth, Bacteriology of, and Its Treatment. Charles Dillon. (Cur. Lit.) 1850
Trismus, Traumatic: Report of a Case. Virgil Marinelli. (Incs. of Prac.) 656
Tuberculosis, Oral, as the Initial Manifestation of Rapidly Progressive Fatal Tuberculosis. Leon H. Collins, Jr. and Thomas J. Cook. 1608
Manifestations of. K. Fulton. (Cur. Lit.) 482
New Treatment of. R. J. Fitzgerald and A. L. Banyai. 1647
Tuckey, H. A. "Why Not Save the Pulp Involved Tooth?" (Corres.) 1160

Tumors
Adenocarcinoma, Intraoral Minor Salivary Gland. J. Wirth. (Cur. Lit.) 485
Benign and Malignant, of the Jaw. F. R. Spencer, C. F. Hagner and W. C. Block. (Cur. Lit.) 1688
Mixed, of the Salivary Gland Type Seen in the Pharynx. C. Fox. (Cur. Lit.) 484
Mixed, of the Salivary Glands, Pathogenesis and Radium Therapy of. I. Levin. (Cur. Lit.) 650
Odontomata, Follicular. Joseph L. Bernier. (Cur. Lit.) 1370
Tunnicliff, Ruth. Action of Gastric and Salivary Mucin on Phagocytosis. (Cur. Lit.) 1166
and Carolyn Hammond. Artificial Caries Produced by Streptococcus Viridans. (Cur. Lit.) 992
Tuttle, W. W., and William D. Zoethout. Textbook of Physiology. (Bibliog.) 938
Tylman, Stanley D. Crown and Bridge Prosthesis. (Bibliog.) 1814
Typhoid Vaccine, Tic Douloureux: Etiology, Accurate Diagnosis and Treatment by the Use of. T. A. Hardgrove. 507

U

U. S. Pharmacopoeia. (Assn. Acts.) 1158

V

Van Huysen, Grant, and W. B. Gurley. Histologic Response of the Teeth of Dogs to Operative Procedures. (Cur. Lit.) 1852
VanKesteren, M., and B. G. Bibby. Effect of Fluorine on Mouth Bacteria. (Cur. Lit.) 1851
VanVoorhis, S. N., J. F. Volker, H. C. Hodge and H. J. Wilson. Adsorption of Fluorides by Enamel, Dentin, Bone and Hydroxyapatite as Shown by the Radioactive Isotopes. (Cur. Lit.) 1691
Vanse, R. B., J. O. French, M. L. Hooker and A. L. Robinson. Dental Anesthesia in Children. Comparison of Vinyl Ether and Ethyl Chloride in a Series of 200 Cases. (Cur. Lit.) 992
Vastine, J. H., 2d, and G. E. Pfahler. Roentgen Diagnosis of Cancer of the Accessory Sinuses. (Cur. Lit.) 1692
Vaughan, Harold Stearns. Congenital Cleft Lip, Cleft Palate and Associated Nasal Deformities. (Bibliog.) 608
Villareal, Precioso B. Extraction of Impacted Bicuspid, with Improvement in Eyesight. (Incs. of Prac.) 324
Susceptibility to Colds Cured by Sinus Drainage After Extraction of Molar. (Incs. of Prac.) 328
Vincent's Infection. W. Rose. (Cur. Lit.) 319
Bacteriology of Trench Mouth and Its Treatment. Charles Dillon. (Cur. Lit.) 1850
Neo-Arsphenamine. Prescribing Suggestions. (Council Dent. Ther.) 1136
Neoarsphenamine and Sulpharsphenamine, Effects of Fusospirochetal Infection, Experimental, in Guinea Pigs. Theodor Rosebury, Genevieve Foley and F. Righta. (Cur. Lit.) 216
Therapy of Fusospirochetosis. Henry Field, Jr. (Cur. Lit.) 1166
Treating, by the Spray Method, Dangers in. L. G. Barrett. (Incs. of Prac.) 488
Vincent's Disease Treated with Nicotinic Acid. J. D. King. (Cur. Lit.) 1690
Vincent's Stomatitis. R. W. Leigh. (Cur. Lit.) 1525
Vinethene Anesthesia in Dentistry and Oral Surgery, Scope and Utility of. S. Cartin. (Cur. Lit.) 486
Vinyl Ether and Ethyl Chloride, Comparison of, in a Series of 200 Cases. Dental Anesthesia in Children. J. O. French, M. L. Hooker, R. B. Vanse and A. L. Robinson. (Cur. Lit.) 992
Virus, Submaxillary Gland, of the Guinea-Pig, Studies on the Pathogenicity and Cytological Reactions of. C. T. Rosenbusch and A. M. Lucas. (Cur. Lit.) 159
Vitamins
B. Caries, Dental, Digest of the Etiology of: Introducing a New and Original Hypothesis. Cecil D. Hearman. (Cur. Lit.) 159
B. Dry Socket, Treatment of: Preliminary Report. William E. Shea. 1482
B. Neuralgia, Trigeminal, Major, (Tic Douloureux), Relief of Symptoms of. H. Bersook, M. Y. Kremers and C. G. Wiggins. (Cur. Lit.) 1693
B_2 Complex, and Glossitis, in Pellegra, Sprue and Allied States. P. Manson-Bahr. (Cur. Lit.) 2012
(C Deficiency in Relation to Paradental and Carious Lesions.) F. Ruspa. (Cur. Lit.) 1526
C Deficiency, Relation of, to Nutritional Anemia. H. Aron. (Cur. Lit.) 483
C Intake, Effects of, upon the Degree of Tooth Injury Produced by Diphtheria Toxin. C. G. King, R. R. Musulin and W. F. Swanson. (Cur. Lit.) 2011
C, Rapid Method of Differentiating Children with Large or Small Reserves of. John Pemberton. (Cur. Lit.) 1852
C Requirements of Native Mine Laborers. F. W. Fox, L. F. Dangerfield, S. F. Gottlich and E. Jokl. (Cur. Lit.) 1690
D, Activity of, Effect of Fluorine on, in Rachitic Rats. S. B. Finn and K. Morgareidge. (Cur. Lit.) 1693
D: Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations. C. I. Reed, H. C. Struck and I. E. Steck. (Bibliog.) 441
D, Effect of Application of, to Dentin in Dogs. P. S. Failla and C. I. Reed. (Cur. Lit.) 1852
D Intake, Relation of, to the Age of the Infant at the time of Eruption of the First Deciduous Incisor. I. D. Speidel and Genevieve Stearns. (Cur. Lit.) 2010
K. (Council Dent. Ther.) 1986
Vitamins Plus, Federal Trade Commission Stipulation on. (Council Dent. Ther.) 1989
Vogel, Irving S. Fused Cuspid and Bicuspid. (Incs. of Prac.) 488
Volker, F. Effect of Fluorine on Solubility of Enamel and Dentin. (Cur. Lit.) 993
Studies on the Acid Solubility of Human Enamel. (Cur. Lit.) 828
H. C. Hodge, H. J. Wilson and S. N. Van Voorhis. Adsorption of Fluorides by Enamel, Dentin, Bone and Hydroxyapatite as Shown by the Radioactive Isotopes. (Cur. Lit.) 1691
Vulcanite, Factors in Porosity in. P. B. Taylor. 564

W

Waas, Milton J. Has Experience Justified Prophylactic Odontotomy? 1095
Wagner Health Bill. (Editorial) 273
Wagner, Ralph O. Pulp Treatment of Deciduous Teeth. 1083
Wainwright, W. W. Human Saliva. VIII, A Study of Rate of Flow of Activated Saliva. (Cur. Lit.) 158
and Hermann Becks. Human Saliva. IX. Effect of Activation on Salivary Flow. (Cur. Lit.) 158
Waite, Frederick C. Ohio's Influence upon the Development of American Dentistry. 1635
Wald, Samuel Stanley, and John Oppie McCall. Clinical Dental Roentgenology. (Bibliog.) 1118
Waldapfel, R., and J. P. Rigg. Lymphangioma of the Tongue. (Cur. Lit.) 1371
Waldman, David. Impression Tray. (Prac. in Par.) 157
Pressure Anesthesia. (Prac. in Par.) 157
Walker, W. E., Gerald J. Cox, Margaret C. Matuschak, Sara F. Dixon and Mary L. Dodds. Experimental Dental Caries. IV.

Fluorine and Its Relation to Dental Caries. (Cur. Lit.) 991
Walls, R. M. Preliminary Study of the Adult Dental Need. (Econ.) 806
Waugh, Donald R., and Leuman M. Waugh. Effects of Natural and Refined Sugars on Oral Lactobacilli and Caries Among Primitive Eskimos. (Cur. Lit.) 991
Waugh, Leuman M. An Unsweetened Tooth Cannot Decay! (Bur. Pub. Rel.) 1124
and Donald B. Waugh. Effects of Natural and Refined Sugars on Oral Lactobacilli and Caries Among Primitive Eskimos. (Cur. Lit.) 991
Maxwell Karshan and Eli H. Siegel. Biochemical Studies of the Saliva of Eskimos. (Cur. Lit.) 653
Eli H. Siegel and Maxwell Karshan. Dietary and Metabolic Studies of Eskimo Children with and Without Dental Caries. (Cur. Lit.) 653
Wax Distortion, Control of, by Manipulation. R. L. Lasater. 518
Inlay Casting, Certified. (A. D. A. Specification.) (Res. Com.) 792
Inlay Casting, Certified, Survey of. (A. D. A. Specification.) (Res. Com.) 451
Inlay Casting, Revision of American Dental Association Specification No. 4 for. John R. Beall. (Res. Com.) 1140
Weatherford, Harold L. Some Observations on the Tusks of an Indian Elephant; Innervation of the Pulp. (Cur. Lit.) 827
Weinmann, Joseph. Keratinization of the Human Oral Mucosa. (Cur. Lit.) 994
and Moses Diamond. The Enamel of Human Teeth. (Bibliog.) 1297
and Rudolf Kronfeld. Metastatic Adenocarcinoma in the Lower Jawbone. (Cur. Lit.) 1370
and Rudolf Kronfeld. Traumatic Injuries in the Jaws of Infants. (Cur. Lit.) 1850
Weisberger, David, C. Truman Nelson and Paul E. Boyle. Development of Caries in the Teeth of Albino Rats Following Extirpation of the Salivary Glands. (Cur. Lit.) 654
Weisberger, D. B., and I. T. Nathanson. Treatment of Leukoplakia Buccalis and Related Lesions with Estrogenic Hormone. (Cur. Lit.) 320
Welch, Eileen, Ethel L. French, Helen Tefft, Margaret Rathbun, Jane Eckhardt and Harold C. Hodge. Composition of Precolumbian Teeth. (Cur. Lit.) 826
Wellings, A. W. Critical Review of Recent Histologic and Other Researches. (Cur. Lit.) 1688
Wells, Horace. (Portrait) 306
Anesthesia, Discovery of. (Editorial) 438
Welsch, M. (Destruction of Bacteria in Actinomycosis by Ultra-Violet Rays.) (Cur. Lit.) 485
Werkman, C. H. Bacterial Dissimilation of Carbohydrates. (Cur. Lit.) 319
Wessinger, G. D., and L. S. Fosdick. Carbohydrate Degradation by Mouth Organisms. II—Yeast. 203
Wheeler, Russell C. Tooth Form. Drawing and Carving: A Manual. (Bibliog.) 442
White House Conference on Children in a Democracy. (Assn. Acts.) 289
White, Ruth L., and Reidar F. Sognnaes. Oral Conditions of Children in Relation to State of General Health and Habits of Life. (Cur. Lit.) 1689
Wiggins, C. G., H. Bersook and M. Y. Kremers. Relief of Symptoms of Major Trigeminal Neuralgia (Tic Douloureux). (Cur. Lit.) 1693
Williams, Ashbel C. Ludwig's Angina. (Cur. Lit.) 652
Willman, Warren, and Gerald J. Reed. Galvanism in the Oral Cavity. 1471
Wills, J. H., and J. C. Forbes. Dietary Effects upon the Acid Neutralizing Power of the Saliva. (Cur. Lit.) 486
Wilson, George W., Charles G. Darlington, Howard C. Miller, Walter H. Wright and George R. Moore. 1939 Year Book of Dentistry. (Bibliog.) 440
Wilson, H. J., J. F. Volker, H. C. Hodge and S. N. VanVoorhis. Adsorption of Fluorides by Enamel, Dentin, Bone and Hydroxyapatite as Shown by the Radioactive Isotopes. (Cur. Lit.) 1691
Wilson, Walter A. Illegal Practice of Dentistry. 197
Winkler, Annelise, and Kurt Redecker. (Disinfection of Dental Instruments with Zephirol.) (Cur. Lit.) 1164
Winter, George B. A Third Set of Teeth? 110
Memorial Issue of Archives of Clinical Oral Pathology for. (Assn. Acts.) 1327
Winter, Leo. Textbook of Exodontia. (Bibliog.) 1654
Wirth, J. Intraoral Minor Salivary Gland Adenocarcinoma. (Cur. Lit.) 485
Wissn, J. M. Education to Improve Dental Conditions. (Proc. Am. Public Health Assn., 1939.) 634
Wisconsin's Voluntary Sickness Insurance Experiments. (Econ.) 478
Wood, Claude R., Oren A. Oliver and Russell E. Irish. Labio-Lingual Technic. Description of the Labial and Lingual Appliances in the Treatment of Malocclusion. (Bibliog.) 1120
Woodall, D. C. Infection of a Third Molar, with Deafness. (Incs. of Prac.) 1532
Wright, Walter H. Method of Securing Correct Impressions. 1584
The Dentist, the Dental Technician and the Public. 1932
Charles G. Darlington, George W. Wilson, Howard C. Miller and George R. Moore. 1939 Year Book of Dentistry. (Bibliog.) 440
Wynn, W., J. Haldi, G. Bachmann and C. Ensor. Effect of High Calcium and Phosphorus Intake on the Calcium and Phosphorus Balance. (Cur. Lit.) 483

X

Xttrium Treatment for Pyorrhea—Not Acceptable for A. D. R. (Council Dent. Ther.) 609

Y

Youmans, Iva C., and Laura M. Hobbs. Rôle of Streptococcus in Some Dental Infections: A Study of Residual Areas. (Cur. Lit.) 2012

Z

Zelson, Harry. Bacteriologic Evaluation of Electrosterilization. 1896
(Zephirol, Disinfection of Dental Instruments with.) Annelise Winkler and Kurt Redecker. (Cur. Lit.) 1164
Zidek, Z., R. Harrison and E. Hammens. Studies on Lactobacilli. II. Type-Specific Immunological Reactions of Oral Strains. (Cur. Lit.) 317
Ziegler, Edwin E., John W. Trask and Edwin C. Maloof. The Solvent Action of Various Substances on Teeth: A Quantitative Determination. 1013
Zinc, Natural Occurrence of, in the Teeth. D. B. Cruikshank. (Cur. Lit.) 1165
Phosphate Cements, Certified. (A. D. A. Specification.) (Res. Com.) 795
Ziskin, Daniel E., and S. N. Hackberg. Effect of Castration and Hypophysectomy on the Gingiva and Oral Mucous Membranes of Rhesus Monkeys. (Cur. Lit.) 1851
Theodora N. Salmon and Edmund Applebaum. Effect of Thyroparathyroidectomy at Birth and at Seven Days on Dental and Skeletal Development of Rats. (Cur. Lit.) 1167
Zoethout, William D., and W. W. Tuttle. Textbook of Physiology. (Bibliog.) 938
Zonite Products, Federal Trade Commission Stipulation on, Abstract of. (Council Dent. Ther.) 789

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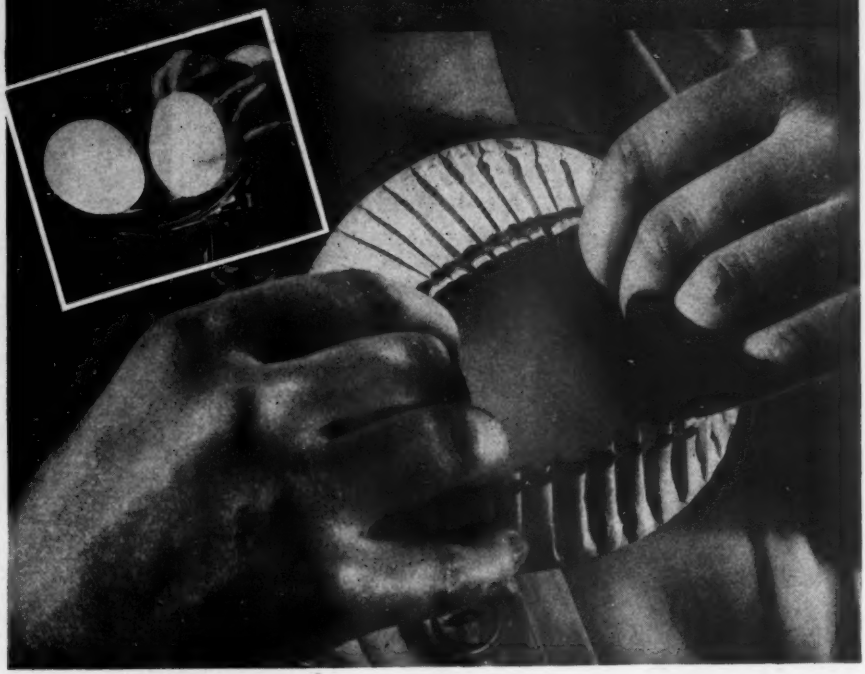

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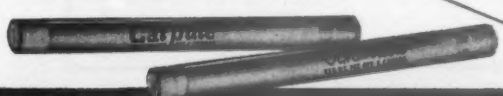

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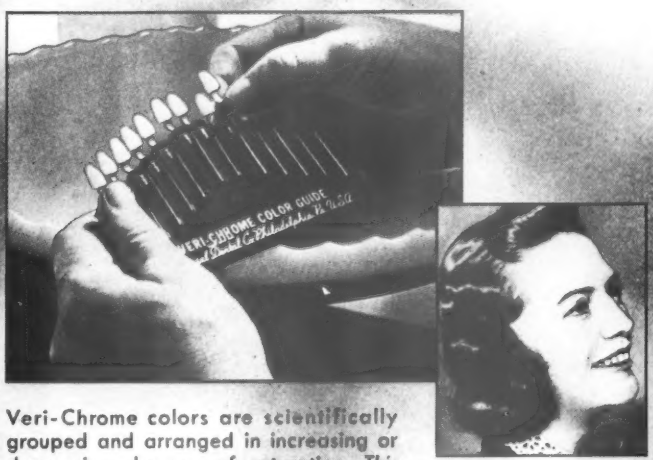

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MANUFACTURERS OF THE MOST COMPLETE LINE OF PORCELAIN TEETH

48th AND BROWN STREETS • PHILADELPHIA, PENNSYLVANIA

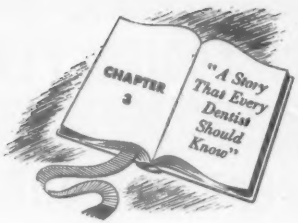
It's a big drop

TO YOU who have the responsibility of prescribing for the dental health and comfort of denture patients, this is an important drop.

It's a drop of pure methyl methacrylate monomer. Derived from coal, air and water, by Du Pont at Belle, W. Va., it is the basic ingredient from which "Lucitone" denture material is made. As such, its purity is of the utmost importance. As such, it's a "*big* drop in the bucket" to you.

That's why Du Pont uses *only* pure monomer for "Lucitone." Since it was never used for any other purpose, you can be confident that it is free from residual impurities which might affect the color, form, strength and uniformity of the final dentures.

As an added precaution, the monomer is re-distilled at the Du Pont plastics plant at Arlington, N. J., to



in the bucket

make doubly certain no foreign substances are present, and stored under refrigeration to insure the uniformity of the product. Distillation is precisely controlled by automatic temperature and pressure regulating instruments. After that the monomer must undergo six control tests to establish its purity beyond any doubt before it starts on the final steps to becoming "Lucitone."

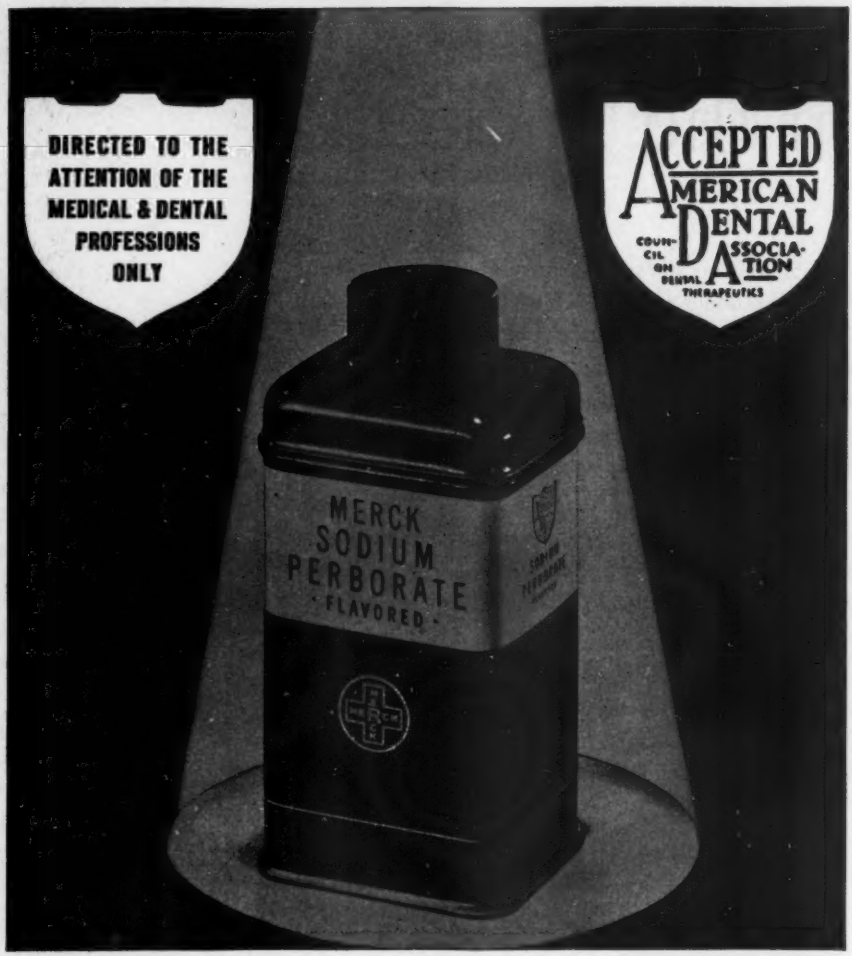
Each one of these control tests is to guard against specific things going wrong which might affect the purity or stability of the denture later. As a result, they *don't* go wrong in "Lucitone."

That's one of the reasons you can always be *sure* of "Lucitone," an acrylic resin specially synthesized for dentures. And that's why you can feel safer in specifying it for your patients. E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Arlington, N. J.

"Lucitone," the only methyl methacrylate resin denture material made by Du Pont, is distributed solely by The L. D. Caulk Co., Milford, Del.

MERCK SODIUM PERBORATE FLAVORED

ANTISEPTIC-DEODORANT-BACTERICIDE


DIRECTED TO THE ATTENTION OF THE MEDICAL & DENTAL PROFESSIONS ONLY
ACCEPTED AMERICAN DENTAL ASSOCIATION COUNCIL ON DENTAL THERAPEUTICS
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MERCK & CO. Inc. *Manufacturing Chemists* **RAHWAY, N. J.**

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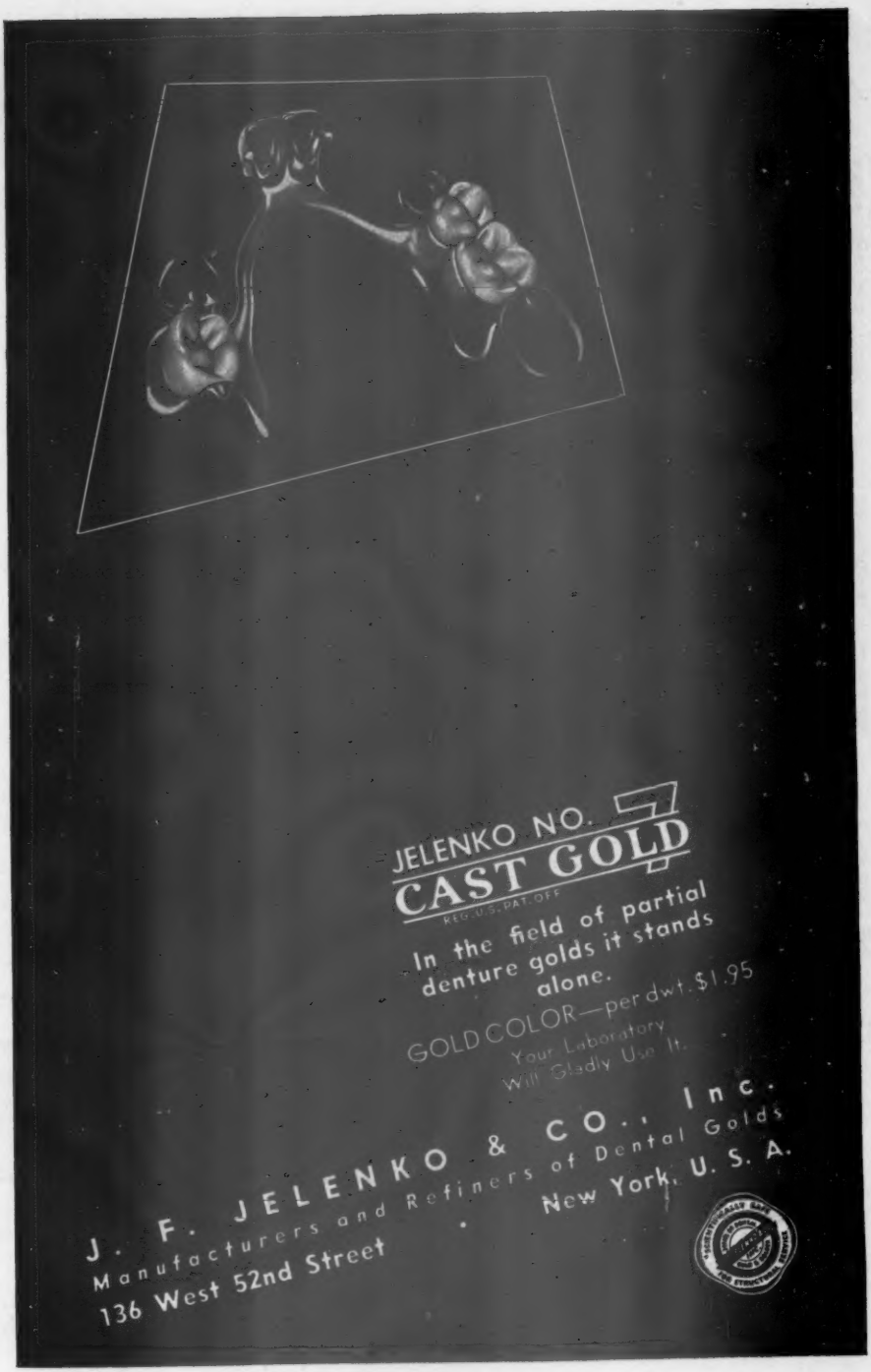
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In the field of partial denture golds it stands alone.
GOLD COLOR—per dwt. $1.95
Your Laboratory Will Gladly Use It.
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Announcing TRUE DENTALLOY

SIGRENS

is a registered trade-mark indicating hermetically sealed, dust and moisture proof, transparent envelopes, each containing six grains of True Dentalloy —the estimated amount of alloy required for the average small amalgam filling. More than one SIGRENS can be used for larger fillings.

No Guesswork in Alloy-Mercury Ratio

SIGRENS eliminate guesswork proportioning. Each SIGRENS contains the correct amount of True Dentalloy for one dispensing of mercury from the S. S. White Mercury Dispenser giving you a ratio of 7½ parts mercury to 5 parts alloy.

Untouched by Hand

From raw material to sealed package, SIGRENS are handled, weighed and sealed by automatic precision machinery, assuring you of uncontaminated alloy. The first hands to touch True Dentalloy SIGRENS are your own.

Convenient and Economical

SIGRENS are easy to use. They tend to eliminate waste. Through accurate proportioning, the amount of alloy saved when using SIGRENS will more than make up the difference in price between True Dentalloy SIGRENS and alloys dispensed by other methods. The 80 SIGRENS in the one-ounce package are enough for 80 small or 40 large fillings, with an average of 60 fillings.

☆

Try SIGRENS Without Cost or Obligation

TRUE DENTALLOY SIGRENS

New User Package

CONTENTS:

Five one-ounce packages containing 80 SIGRENS each • One Mercury Dispenser and empty Mercury Bottle • One Free Trial package of 40 SIGRENS.

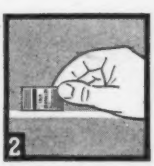
PRICE $9.75

Use the SIGRENS in the package marked "Free Trial." If you like this new, accurate and economical method of dispensing True Dentalloy, accept the charge for $9.75. However, if you are not pleased with SIGRENS, return the five 1 oz. packages intact, together with the Mercury Dispenser, and receive full credit.

☆

Easy to use

1. Detach a SIGRENS from the continuous perforated strip in the one-ounce package.



2. Tap the alloy to one side of the envelope.

3. Tear the envelope down the center, lengthwise.

Sold by Your Local Dealer

Sigrens

The new, modern, accurate and economical method of dispensing alloy for amalgam fillings.

Like opening a fresh bottle of alloy for each filling.

S. S. WHITE MERCURY DISPENSER

BLACK BAKELITE

Assures accurate proportions of mercury. A plunger, on the side, releases the correct quantity of mercury for each SIGRENS. Included are a ¼ lb. empty mercury bottle and a Vinylite washer.

PRICE $1.50

4. Shake contents into a mortar.

5. Invert mercury dispenser and press plunger. One dispensing for each SIGRENS used.

6. Triturate under moderate pressure until amalgamation takes place.

☆

Through these simple operations, you can be sure that better results will be obtained from the accurately dispensed proportions of alloy and mercury.

☆

The S. S. White Dental Mfg. Co., Philadelphia, Pa.

JUSTI *Vita-lux*

PROSTHETIC TEETH LOOK NATURAL ALL THE TIME

THE high translucency of Vita-lux Prosthetic Teeth and their evenly blended shading from gingival to incisal combine to provide constant natural beauty under artificial as well as daylight. *Day or night, they look right!* There is no line of demarcation, no darkened areas to shout "false teeth."

40% stronger by actual test, they reduce checking and breaking to a negligible factor. For "human" aesthetics and functional perfection, specify Vita-lux Prosthetic Teeth. Available in 8 fundamental Vita-lux shades.

TUBE TEETH. Vita-lux Tube Teeth are available in anterior and posterior molds for both full and partial dentures. They assure natural lingual anatomy and added tongue room for dentures; lustrous natural translucency not obtainable with metal backed facings for cast removables.

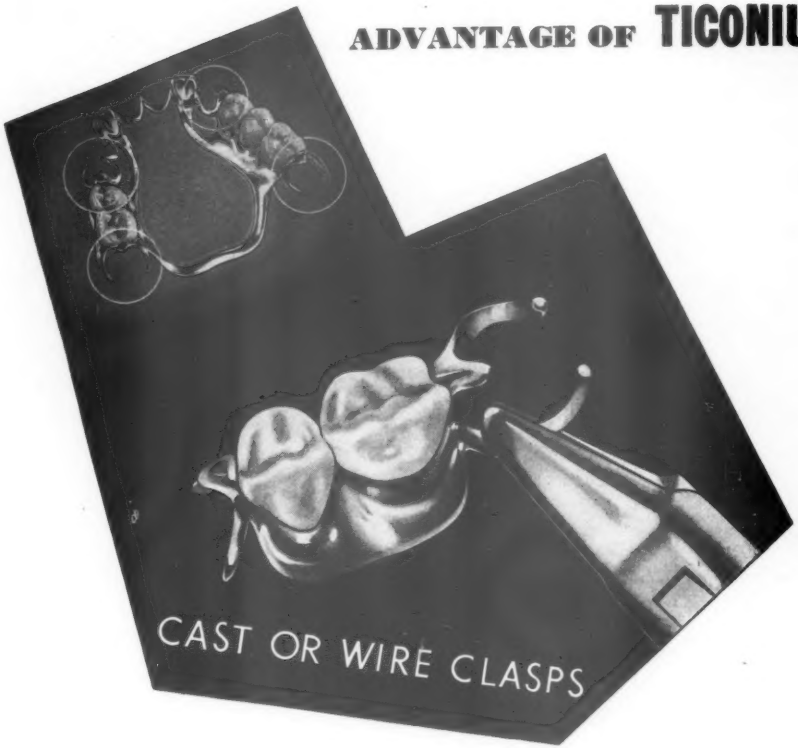
PINORO TEETH. Justi's popular Pinoro Teeth are suggested for medium priced restorations. They have a precious metal anchorage: 100% gold covered pin. Strong, dense—"they can take it when it comes to grinding," and serviceable. Available in your favorite molds and shades.

H. D. JUSTI & SON, INC.

The Oldest Manufacturer of Porcelain Teeth in America

PHILADELPHIA

WIRE CLASPS ARE AN EXCLUSIVE ADVANTAGE OF TICONIUM

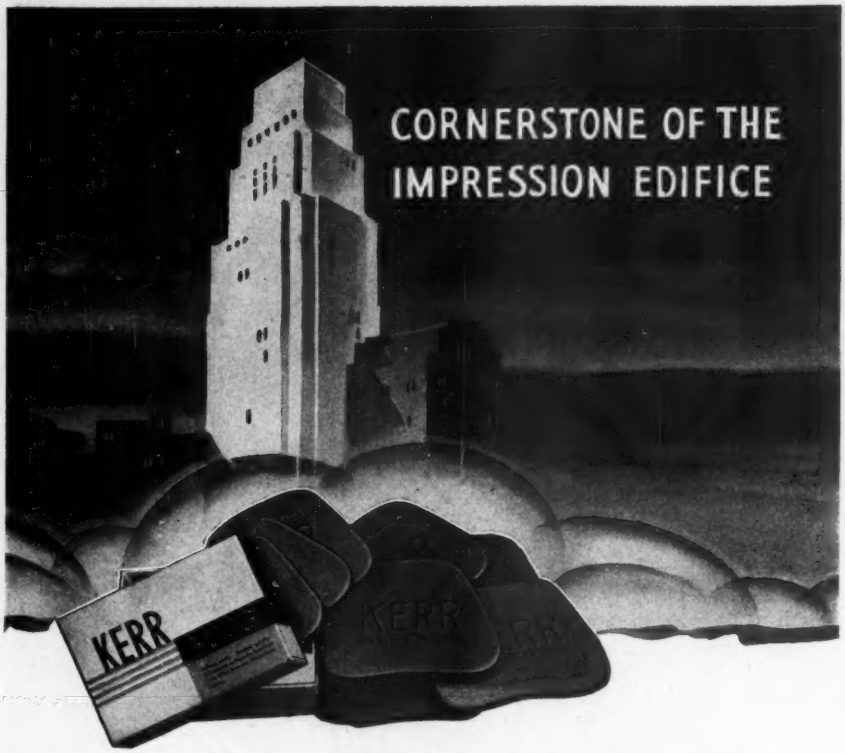


Ticonium is the single non-precious metal which can be fabricated with either cast or wrought wire clasps of the same basic alloy. Ticonium wrought wire clasps retain their life and resiliency and can be adjusted with the same ease and safety as clasps of good gold wire. Wire clasps are preferred by many dentists.

TICONIUM

THERE IS A TICONIUM LABORATORY NEAR YOU

Widen the Beneficial Circle



Progress continues steadily in the art of Impression-taking. Clever new techniques are coming into use to meet special conditions. But KERR Impression Compound remains today, as for many years, the cornerstone of the whole Impression edifice.

Your special technique may employ impression paste, hydrocolloid, wax or plaster. We supply them all in full KERR quality and value. But the first essential in your whole operation is the old reliable KERR Impression Compound, world leader for a generation.

We appreciate this confidence which the Profession has so long reposed in KERR Impression Compound. We will continue to safeguard that confidence with every possible precaution.

KERR DENTAL MFG. CO., Detroit

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IMPRESSION COMPOUND

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3 times as fine* yet Fleck's combines the strength of 2 cements.

Although the extraordinary strength of Fleck's Cement has always been taken for granted, few doctors realize that Fleck's actually provides the strength of two cements.

It may seem that such a great reserve, while it guarantees endurance, might not wholly be brought into effective use. However, since scientific research clearly exposes the direct bearing of cement strength on cement density, and its power to resist disintegration, you can readily understand why Fleck's holds forever . . . regardless of the extent to which it is subjected to stress or strain.

That's why Fleck's Cement is now used in the majority of clinics and dental offices throughout the entire world.

*Three times as fine as A.D.A. specifications.

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LIBERAL HOSPITAL EXPENSE COVERAGE FOR $10.00 PER YEAR

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38 years under the same management
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Disability need not be incurred in line of duty—benefits from the beginning day of disability
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Grapefruit and the Dental Health of the Young

It is often the privilege and opportunity of the dentist to recognize the beginnings of sub-clinical scurvy in his young patients before this result of Vitamin C deficiency is brought to the attention of a physician.

In such cases grapefruit . . . like oranges, one of the richest sources of Vitamin C . . . furnishes the universally accepted *specific* for combating the avitaminosis. Grapefruit, like other citrus fruits, may be a highly important dietary factor during the formative stage of the various tooth structures.

By scientific laboratory experimentation, citrus juices have also been shown to aid in the assimilation and retention of calcium taken *in other foods.*

Most growing children like grapefruit, and it is therefore not difficult to add it to their diets successfully.

Members of the dental profession desiring a complete and authoritative study of citrus fruits in the diet are invited to fill out the coupon below for a complimentary copy of the recently published brochure of the Citrus Commission of the State of Florida—"Citrus Fruits and Health."

FLORIDA CITRUS COMMISSION
STATE OF FLORIDA

Florida Citrus Commission Dept.-31-P
Lakeland, Florida

Gentlemen:

Please send me your book, CITRUS FRUITS AND HEALTH.

Name_____

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Profession_____

Confident in her dentist and his work. Appreciative of his sympathetic understanding. Loyal!

Is this your patient?

Small things—if they are the right things—can play a big part in fostering such loyalty . . . and in strengthening the bond between you and your patients.

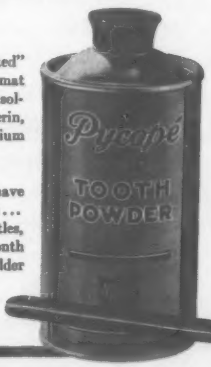
For instance, *one* of the wise things you can do is prescribe Pycopé Tooth Powder and Pycopé Tooth Brushes. This is *your* powder—*your* brush—*never publicly advertised!*

Because recommendation of these ethical products represents your special knowledge in the dentifrice and tooth brush field . . . they readily become symbols of your concern for your patients' well-being . . . a thoughtfulness which patients are quick to appreciate.

PYCOPÉ, Inc., 2 High St., Jersey City, N. J.

PYCOPÉ "Council Accepted" TOOTH POWDER can't mat a brush . . . is immediately soluble . . . contains no glycerin, grit, acid, soap . . . no sodium perborate.

PYCOPÉ BRUSHES have small heads, rigid handles . . . scientifically spaced bristles, wedge-cut tufts . . . a two-month guarantee. Educational folder included



IT'S GOOD PRACTICE TO PRESCRIBE

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TOOTH POWDER & TOOTH BRUSHES

THE inherently greater resilience of platinum-palladium-golds holds partials comfortably in alignment without extreme rigidity which has a tendency to damage abutment teeth.

Increased strength of these precious metal alloys enables you to use fewer pennyweights of metal. Thus your restorations are lighter in weight and less bulky...yet fully safeguarded against breakage.

Casting and wrought platinum-palladium-golds are readily available to you under many nationally known trade names. There is an alloy to meet strength requirements of every type of restoration.

Platinum Metals Division
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

CANNED FOODS IN THE MODERN PATTERN OF NUTRITION

● Generalities as to human nutritive requirements are of but limited use in the practical application of our modern knowledge of nutrition. This is particularly true where expert and experienced advice on diet formulation is not readily or conveniently available. For those concerned with actual diet planning or administration, more specific information on nutrition is desirable.

During recent years, several excellent texts have become available which present reliable guidance in diet planning (1, 2, 3). One important factor governing conformance with any diet pattern, of course, is the economic status of the individual, family, or group. A recent text presents a workable system in which rather full consideration has been given to this factor (1).

Under this pattern, the common foods have been classed according to their nutritive contributions into some 12 groups. These groups include milk; potatoes and sweet potatoes; mature dry legumes and nuts; tomatoes and citrus fruits; leafy green and yellow vegetables; other vegetables and fruits; eggs; lean meat, poultry, and fish; flour and cereals; butter; other fats; and sugar. There will, of course, be quantitative differences in the nutritive values of individual foods within a single group. However, there is sufficient similarity so that the foods within a group can be used interchangeably as conditioned by factors such as availability, relative costs, and personal, racial, or religious preferences. In order to minimize variation of nutritive values obtained from each food group, it has been suggested that as wide a variety of foods within a group, as practical, be consumed.

In connection with this diet plan, desirable yearly food allotments for persons of various sex, age, or conditions of life are also listed in terms of these twelve food groups. Thus, from information regarding the sex, age, and activities of the members of a family or group, one can compute the yearly amounts of the various foods which should be provided. From the sum of these yearly totals, the food allowances per week or month for the family or group can be estimated. The latitude in the choice of foods, within the twelve specified food groups, makes the diet pattern more adaptable to situations where the economic factor must be considered.

Estimation of food requirements in this manner provides a practical method of diet planning designed to supply the nutritive requirements of an individual, a family, a group, or even a nation. However, the ultimate achievement of an improved nutritional status is dependent upon a readily available supply (at all times) of the various common foods at reasonable cost. It is apparent from the listing of the twelve food groups that many materials of a perishable nature—which are not conducive to year-round production near the centers of large populations—are indispensable in supplying the dietary requirements of our people. Thus, the transportation and storage of foods, in such a manner as to retain nutritive values, are important problems to be considered.

Needless to state, commercially canned foods are well adapted for use in this diet plan. Commercial canneries are located near the sites of abundant supply of freshly harvested foods. The canning processes convert the perishable foods into nutritious canned foods which can be economically transported and marketed throughout the year. Hence, the canning industry plays an important role in the practical aspects of diet planning to improve the nutritional status of the American people.

AMERICAN CAN COMPANY
230 Park Avenue, New York, N. Y.

REFERENCES

1. 1939. Food and Life; Yearbook of Agriculture, U. S. Dept. of Agriculture, U. S. Govt. Printing Office, Washington, D. C.
2. 1939. Accepted Foods and Their Nutritional Significance, Council on Foods of the American Medical Association, Chicago.
3. 1940. J. A. M. A. 114, 548.

We want to make this series valuable to you, so we ask your help. Will you tell us on a post card addressed to the American Can Company, New York, N. Y., what phases of canned-foods knowledge are of greatest interest to you? Your suggestions will determine the subject matter of future articles. This is the sixty-sixth in a series which summarizes, for your convenience, the conclusions about canned foods reached by authorities in nutritional research.

The Seal of Acceptance denotes that the statements in this advertisement are acceptable to the Council on Foods of the American Medical Association.

Buy Relief Fund Seals

BEFORE and AFTER

STEELE'S TRUPONTICS IN THE MOUTH OF YOUR PATIENT SPEAK FOR THEMSELVES

The upper photograph shows the case just before extraction of the two centrals and left lateral . . . restoration made immediately after extraction. The lower picture shows the case results six months later.

Steele's Trupontics are available in anterior and posterior molds and are adaptable to ridges immediately after extraction or to healed ridges.

Trupontics, when properly adapted, offer the most hygienic, esthetic, and serviceable bridge available. Use Steele's Trupontics on your next case and give them a chance to speak for themselves.

The **COLUMBUS DENTAL MFG. CO.,** • **COLUMBUS, OHIO**

DOCTOR — Steele's comprehensive "PROPER ADAPTATION TECHNIC," an illustrated 16-page booklet, is available at your request.

A PERFECT PLATE
...Yet a mental hazard

AUTHORITIES SAY
NEW-DENTURE SUCCESS
60% MENTAL

Why are so many fine dentures doomed to be discarded? Because even the best-made plate is a huge, hard, foreign mass in a mouth that's never worn one. Exerting a biting pressure of 15 to 25 pounds, it torments tender gums . . . often becomes a "mental handicap"... and may end up, unused, in a bureau drawer. Unfortunately, no compliment to the dentist who made it!

EVEN THE FINEST PLATES NEED SHOCK ABSORBERS. That's why during the difficult "learning period," thousands of thoughtful dentists prescribe DR. WERNET'S Powder . . . to provide a protective comfort cushion . . . to lessen irritation . . . to promote ease and assurance . . . to speed denture mastery...and to insure denture success!

A leader for almost 30 years, DR. WERNET'S Powder is never advertised to the public. We believe only a dentist is qualified to prescribe its use.

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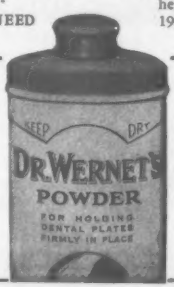
46.5% MORE ABSORBENT
THAN AVERAGE OF 5 LARGEST-SELLING BRANDS TESTED



NEARLY 50,000 DENTISTS USE AND RECOMMEND

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Completes your Denture Service

STERILIZATION BY HEAT

IN the middle ages, long before the days of Pasteur and Lister, heat was used in treating wounds. They knew nothing about bacteria and infection, but they sensed, empirically, that heat protects the wound and prevents complications. Even then there was no compromise with safety.

Today, the use of an anesthetic cartridge without proper sterilization of the puncturable surface, is tantamount to inviting infection.

Metal Cap ANESTUBES

The Metal Cap Anestube is the only cartridge which offers the anesthetist the possibility of sterilization by HEAT. An absolute chain of sterility can be maintained by gently flaming the puncturable metal surface before puncturing the diaphram. This protects the solution within, thus protecting the patient against infection.

Novol anesthetic solution in Metal Cap Anestubes and Novampuls is supplied in Vacuum Tins—a further safeguard against the deterioration of the solution, and an assurance of full potency.

NOVOCOL CHEMICAL MFG. CO., INC.

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A 1941 JOB ON THE ROAD

BUT IN HIS OFFICE...

!sn't there something a little ironical in the annual custom indulged in by some dentists of habitually turning in new cars for somewhat newer ones, yet continuing to "drive" their x-ray units until they fall apart?

Fun is fun, yes; but, after all, business is business. And one of the best ways we know of to improve a dentist's practice is replacement of wornout or obsolete x-ray apparatus with a modern, efficient, dental x-ray unit such as the CDX.

As you well know, patients—especially prospective ones—are all too easily impressed with visible signs of progressiveness. And, while they may never see their dentist's new car, they can't fail to notice an ageing x-ray machine.

And so we suggest: This year, turn in your x-ray for a new CDX X-Ray Unit!

Please send me—without obligation—a copy of the CDX catalog, and information about the CDX convenient payment plan.

DR._____

ADDRESS_____

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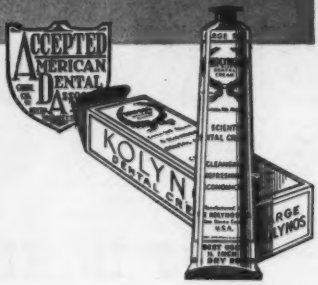

USE ONLY

½ inch

ON DRY TOOTH BRUSH

KOLYNOS Dental Cream is a concentrated dentifrice that contains no added water. When used, one half inch on a dry brush, Kolynos produces a foamy cream in the mouth that assists the brush in cleaning and polishing the teeth without harmful abrasive action.

KOLYNOS

Concentrated

DENTAL CREAM

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The 7th Edition of this comprehensive manual, revised according to the United States Pharmacopeia, Eleventh Decennial Revision, covers everything of importance in the field of dental medicine in full detail. 476 pages, 81 illustrations. PRICE, $6.00.

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This book is divided into three parts, the first taking up such topics as composition of drugs, pharmaceutic preparations, actions of drugs, etc. Part II arranges drugs in groups according to their uses. Part III gives directions for laboratory work. 340 pages, 25 illustrations. PRICE, $4.00.

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Ouch!

"This hurts me more than it does you" is an old saying that is full of meaning to dentists also. For when a patient suffers needless pain he tells his friends, delays appointments, may not come back at all . . . . When using a local anesthetic it is wise to use a GOOD one. Much depends upon the choice of the brand. That choice not too infrequently determines the success of anesthesia, the comfort of the patient and the practice-building possibilities associated with the routine use of local anesthetic.

Rigid precautions to safeguard the solutions are practiced by MINIMAX. These include delivery to you in a scientific HY-VAC package, a dust proof, damp proof, wholly oxygen-free container. You get Minimax solutions full of "vim, vigor and vitality."

Relaxed mentally and physically, receptive to your operative skill in comfort, confidence . . . unafraid, your patients will be pleased when you use Minimax anesthetic solutions. For personal peace of mind and the feeling of complete security you may depend upon Minimax.

Hy-Vac package patented U. S. Patent Number 2,215,479.
Prepared in three strengths: Epinephrin 1:30000, 1:50000, 1:70000.
Supplied in two size cartridges: large for standard syringes, small for short syringes: 25 ctgs. in each Hy-Vac package.

MINIMAX

The Minimax Co. · Medical & Dental Arts Bldg. · Chicago

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The Newer Concepts of Meat in Nutrition

Meat

AND THE ESSENTIAL

Amino Acids

ALTHOUGH protein has long been regarded as an essential component of the human dietary, the role of individual amino acids has only recently been learned. The theory that proteins are broken down into their component amino acids which are then simply regrouped by the body for protein synthesis has been generally accepted, but is now being challenged by some investigators.

Alcock[1] believes that protein synthesis starts with substances more elementary than amino acids, basing this statement upon the fact that animals can produce dispensable amino acids when these are not provided by the diet. With regard to indispensable or essential amino acids, he states that an animal from whom tryptophane is withheld secretes pepsin which contains tryptophane and continues to survive for a limited time with growth of hair and skin. Alcock reasons that tryptophane and the other essential amino acids are needed for their "specific functions," and not because the organism cannot synthesize them for protein formation. That the essential amino acids might perform a hormone-like function, is suggested by the varied manifestations of essential protein deprivation—failure of growth, loss of hair, anemia, nervous irritability, susceptibility to infection, loss of weight; caries and gingival affections frequently are part of the general picture.

Regardless of the validity of Alcock's theory, the indispensability of certain amino acids is acknowledged by all workers. These ten[2]—arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophane, and valine—must be fed daily in adequate quantities for optimum growth and tissue repair. Meat, one of the few sources of complete protein, provides all of the essential amino acids in abundant amounts. Daily consumption of 60 to 80 Gm. of meat protein (300 to 400 Gm. of meat) is assurance that the organism is receiving an adequate amount of the indispensable amino acids.

[1]Alcock, R. S.: Synthesis of Proteins in Vivo, Physiol. Rev. 16:1 (Jan.) 1936.

[2]Jones, D. B.: Protein Requirements of Man, in Year Book of Agriculture: Food and Life, Washington, D.C., U. S. Gov't. Ptg. Off., 1939, p. 177.

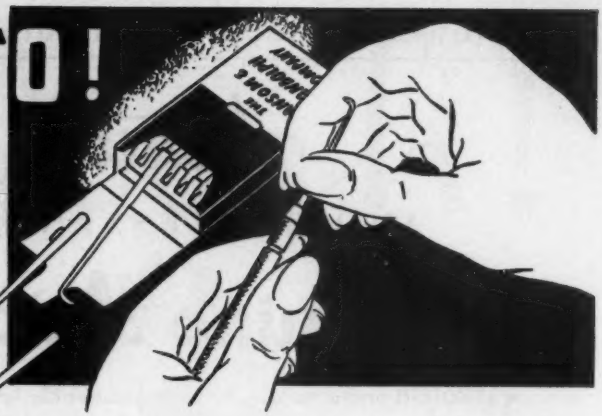
The Seal of Acceptance denotes that the statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

American Meat Institute

CHICAGO

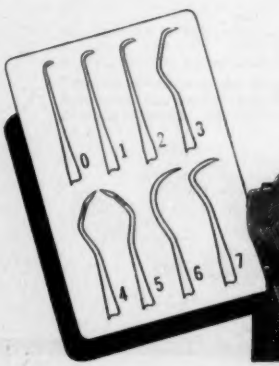
PRESTO!

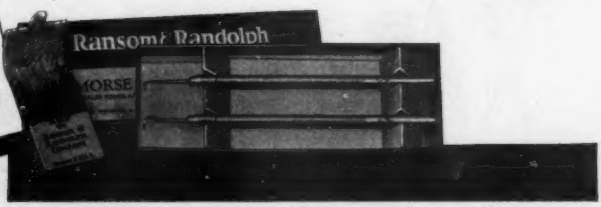
. . A SHARP NEW MORSE SCALER IS READY!



Next to the quality of the instruments themselves, Morse Scaler users appreciate the operating convenience and economy of the Morse interchangeable-point principle. Replacement of a worn scaler involves only inserting a new point in the clutch type handle—as easy as changing burs in your handpiece. And since a Morse Scaler point costs only one-fifth as much as a good long handled scaler, replacement is less expensive than resharpening a conventional instrument . . . The eight types illustrated fulfill virtually every operating requirement—especially as the popular hook scalers 0, 1 and 2 may be bent, cold, to any reasonable angle. Enjoy this greater efficiency and economy by ordering an outfit today.

THE RANSOM & RANDOLPH CO.
TOLEDO, OHIO





● **THE MORSE SCALER OUTFIT . .**
Eight scalers—one of each type; and two clutch type handles—rust-proof and non-tarnishing.
Complete . . **$4.25**

Make the Journal Your Buyer's Guide—

AMERICAN DENTAL ASSOCIATION

OFFICE OF
DR. FRED A. RICHMOND
INSURANCE SECRETARY

HURON BUILDING
KANSAS CITY, KANSAS

November 6, 1940

Dear Doctor:

This will acknowledge receipt of your letter of October 31st stating that you feel there is no place in your insurance program for the A. D. A. Group Insurance since you are unmarried, have no dependents and are both financially and bodily sound.

Even though you do not have anyone directly dependent on you for support, there is probably some youngster you would like to help receive an education or some worthy institution that you would like to assist in the event of your untimely death.

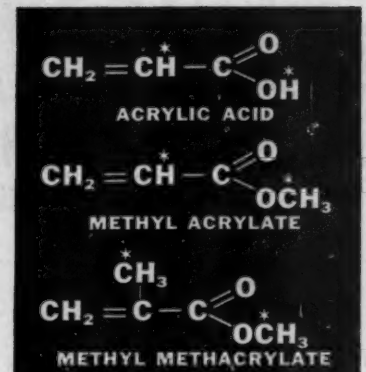
Eliminating everything else, there are two very good reasons that should motivate any young man of your age, 34, and similarly situated, to carry the A. D. A. Group Insurance: (1) Your insurance needs would be drastically changed overnight by marriage, or, (2) a prolonged illness could very conceivably play havoc with your financial condition, your future insurability or your ability to provide credit security. The A. D. A. Group Insurance would, in that event, be a welcome cushion to land on and in any event would be a guarantee of your ability to get whatever kind of policy you might desire at age 51.

In no way can all this be accomplished as economically as through the A. D. A. Group Insurance.

Cordially yours,

Fred A. Richmond

Insurance Secretary, A.D.A.



THE ACRYLIC FAMILY

Soft Acrylic

Carbon — Hydrogen — Oxygen. These are the elements found in acrylic resins, a distinguished family of synthetics outstanding for their permanent colorless transparency, dimensional stability and resistance to chemicals. Formulae of some acrylics, given above, show the molecular structure typical of the entire family. Members of the family used in CRYSTOLEX and VERNONITE differ chemically at the points in the formulae designated by asterisks. These apparently minor variations do not affect the basic family characteristics, but do cause significant differences in physical and working properties.

For example, in its hardest form, ethyl acrylate is soft and flexible, whereas methyl methacrylate is hard and rigid.

The acrylics, however, seldom see service in the form of single molecules, or monomers. It is another family characteristic that molecules of these liquid monomers join together in long chains and become viscous or solid. This process—polymerization—can take place under a variety of conditions, and the physical properties of the finished acrylics can be altered by varying these conditions.

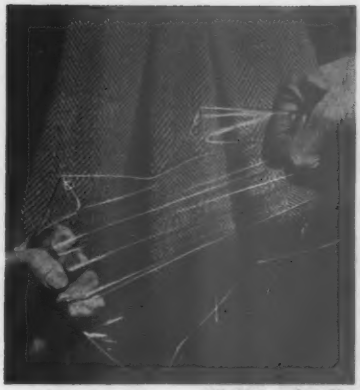
For example, if methyl methacrylate is polymerized rapidly at high temperatures, a shorter polymer chain and more brittle solid is obtained than if heat is applied more gradually.

DANGER OF IMPURITIES

In addition to the physical conditions of polymerization, minute amounts of chemical impurities may also affect polymerization and result in a weaker, more porous product. Within this category fall

---

• *The second in a series of advertisements about acrylic resins, their chemistry and varied uses, by the Rohm & Haas Company, Inc., pioneers in the development of acrylic resins and manufacturers of* CRYSTOLEX *and* VERNONITE, *the original acrylic denture materials.*



Medium Acrylic

Hard Acrylic

decomposition by-products—such as acetone, formic acid and various aldehydes—which are obtained when monomer is made by "cracking" miscellaneous scrap material.

Rohm & Haas has analyzed many cracked monomers offered for sale to the dental profession and in every one has found significant quantities of such impurities.

NEED OF RIGID CONTROL

Thus by rigid control of three factors—formulation, purity, and polymerization—acrylics can be made to meet exacting specifications. Conversely, without careful control it is impossible to predict the nature and properties of the finished acrylic.

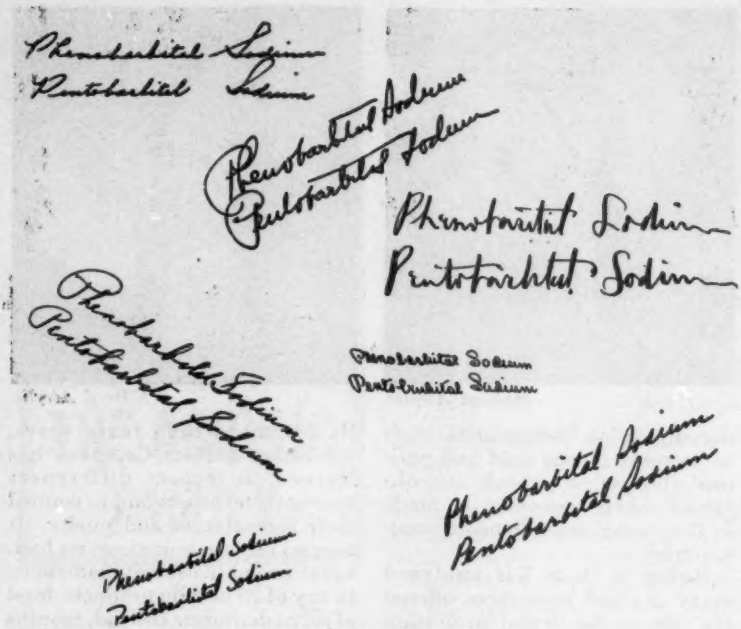
As friends of the acrylic family for more than forty years, the Rohm & Haas Company has learned to respect differences among its members and to control their formulation and purity. It uses no impure monomer, no haphazard combination of monomers, in any of its acrylic products, least of all in dentures. Instead, months of research in collaboration with the laboratories of its two distributors were devoted to the formulation of CRYSTOLEX and VERNONITE, which were tested and proved in thousands of mouths.

Every gram of CRYSTOLEX and VERNONITE is synthesized specifically to these formulations. Each step of their manufacture is carefully controlled to produce acrylics meeting the high standards of the dental profession.

• CRYSTOLEX *and* VERNONITE *are the trade-marks, Reg. U. S. Pat. Office, for the only acrylic denture materials manufactured by the Rohm & Haas Company.* CRYSTOLEX *is distributed by the Kerr Dental Manufacturing Co., Detroit, Mich., and* VERNONITE *by the Vernon-Benshoff Company, Pittsburgh, Pa.*

ROHM & HAAS COMPANY, INC.

WASHINGTON SQUARE, PHILADELPHIA, PA.



ON prescriptions and orders—and even in oral directions—*pento*barbital may be easily mistaken for *pheno*barbital. Fortunately, this confusion may be easily avoided. *Simply write or say* NEMBUTAL when you want to make *certain* that your patient will receive the *short-acting* barbiturate backed by ten years of clinical use. Nembutal is supplied in ½-grain, ¾-grain and 1½-grain distinctive yellow capsules; in 1-grain, 2-grain and 3-grain suppositories; in ampoules containing 3.75 grains of the drug; and in Nembutal Elixir, each fluidounce of which contains 2 grains of the drug. Nembutal is manufactured and distributed *solely* by Abbott Laboratories, North Chicago, Illinois.

★ *Write or say*

NEMBUTAL

(Sodium Ethyl [1-Methyl Butyl] Barbiturate, Abbott)

First....

IN PRECISION TECHNIQUE OF CASTING

WHEN you prescribe Vitallium, you give your patients restorations that fit to their obvious delight and comfort.

The reason is that the Vitallium Microcast Technique, pioneered and perfected by Austenal and used universally by every Vitallium processing laboratory, is exact and unfailing, producing cases for you of predetermined accuracy.

AUSTENAL LABORATORIES, INC.
34 W. 33rd Street, New York
5932 Wentworth Avenue, Chicago

VITALLIUM*

You Can Obtain Outstanding Service from The VITALLIUM LABORATORY Near You

*TRADE MARK REG. U. S. PAT. OFF. BY AUSTENAL LABORATORIES, INC.

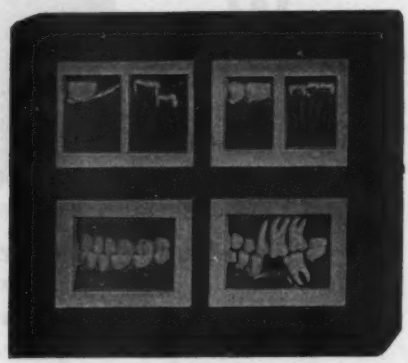
PLASTIC MODELS AND RUBBER MOLDS

VISUAL EDUCATION AIDS
FOR THE BUSY DENTIST

Rubber molds for each of the models listed—75c each

Hand painted plaster models 2½ x 2 x ½ inch in size. Sell for $1.25 each

R.G.-1. Longitudinal section of central incisor
R.G.-2. Longitudinal section of lower bicuspid
R.G.-3. Longitudinal section (buccal-lingual of lower molar)
R.G.-3a. Dental Decay 1st degree
R.G.-3b. Dental Decay 2nd degree
R.G.-3c. Dental Decay 3rd degree
R.G.-4. Longitudinal section of upper first bicuspid
R.G.-5. Bicuspid and molar showing interproximal decay
R.G.-6. Impacted lower third molar
R.G.-7. Normal occlusion
R.G.-8. Malocclusion following loss of molar
R.G.-9. Impacted bicuspid caused by premature loss of deciduous molar.
R.G.-10. Bicuspid Normal Periodontal Membrane
R.G.-10a. Bicuspid. Pyorrhea pocket 1st degree
R.G.-10b. Bicuspid. Pyorrhea pocket 2nd degree
R.G.-10c. Bicuspid. Pyorrhea pocket 3rd degree



Black imitation leather display case with transparent cover $2.00

Case complete with four models.... $6.50

BUREAU OF PUBLIC RELATIONS
AMERICAN DENTAL ASSOCIATION
212 E. Superior St., Chicago, Ill.

A BENEFICIAL PRODUCTION CIRCLE

Inclosed is.....for ☐ Plaster Model ☐ Rubber Mold } of

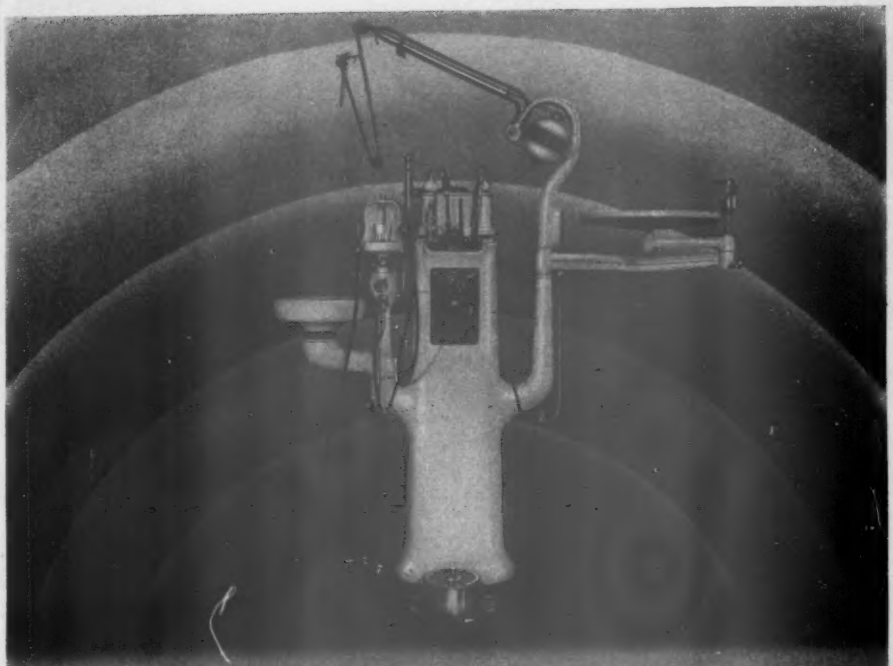
☐ R.G.-1
☐ R.G.-2
☐ R.G.-3
☐ R.G.-3a
☐ R.G.-3b
☐ R.G.-3c
☐ R.G.-4
☐ R.G.-5
☐ R.G.-6
☐ R.G.-7
☐ R.G.-8
☐ R.G.-9
☐ R.G.-10
☐ R.G.-10a
☐ R.G.-10b
☐ R.G.-10c
☐ Case

Name.....

Street.....City.....State.....

Please print plainly full name and complete address

Buy Relief Fund Seals



Additional BEAUTY

The curved artistic lines of the RITTER UNIT make it the instantaneous choice of all who are familiar with the basic principles of art as well as those who are instinctively attracted to things beautiful.

Additional UTILITY

The convenient arrangement of the operative instruments and equipment of the RITTER UNIT so adequately supplements the professional skill of the operator that many valuable hours can be saved weekly. The scientifically worked out design of the RITTER UNIT provides a professional environment that enables the operator to fully utilize his professional skill and obtain the highest possible degree of appreciation from those obtaining the benefit of it.

Additional DURABILITY

The high quality of Ritter workmanship together with the gradual evolution of the RITTER UNIT to the present-day masterpiece has resulted in a unit that IS giving trouble-free service under the most difficult operating conditions. Its long record of unfailing service has won for it the reputation of being as "durable as the pyramids."

RITTER DENTAL MANUFACTURING CO., INC. • ROCHESTER, N. Y.

You Get ALL Three in the Ritter Unit

A MARK OF *Distinction* FOR VITAMIN D PRODUCTS

True distinction can only be attained through merit which has been earned.

Consistent, energetic, well-directed effort in laboratory and clinic, the results of which have been carefully and scientifically tabulated over a period of some fifteen years, give distinctive meaning to the Foundation's Seal. Bioassays for Vitamin D, conducted to U. S. P. standards, fill 60,000 pages of records on 200,000 rats used to check the Vitamin D potency of Foundation-licensed products.

Carefully recorded independent clinical studies of the Vitamin D value of Foundation-licensed products on more than 3,000 children are regimented behind this Seal. Competent investigators work independently at leading hospitals and clinics. Their findings, published in the recognized professional journals, emphasize the importance of this Seal and its message — "Approved for Vitamin D upon periodic tests."

Every Vitamin D product licensed by the Foundation under its famous Steenbock patents is entitled to carry this Seal of distinction. All licensed products are regularly tested, whether or not the Seal appears thereon. Thus, any reference to Foundation licensing appearing on any product package or in its advertising permits you to use, prescribe and recommend that product with utmost assurance of its uniform Vitamin D potency.

ABOUT THE FOUNDATION—The Wisconsin Alumni Research Foundation is an organization not for private profit, formed to receive and administer patentable discoveries voluntarily assigned. Its trustees are alumni who give their services to the Foundation without compensation. All net avails are devoted to scientific research. At present, some 130 projects are under way, being supported by funds appropriated by the Foundation. A comprehensive outline of the history and activities of the Foundation is given in the booklet, "Scholars from Dollars," a copy of which will be sent to you upon request.

WISCONSIN ALUMNI RESEARCH FOUNDATION, MADISON, WISCONSIN

SO THAT'S WHY MY PLATES ARE LOOSE!

I'D BETTER SEE MY DENTIST!

Like her, millions of others are now learning the facts about *alveolar resorption* — learning that the dentist is not at fault when a plate that fitted well at first, becomes loose two or three years later.

As a service to the public and the dental profession, the makers of FASTEETH are regularly telling readers of The Saturday Evening Post, Good Housekeeping, and other publications of large circulation that, in effect, "GUMS SHRINK continuously, causing plates to loosen. SEE YOUR DENTIST to have them refitted properly."

We are glad thus to send denture patients to your office; also to make available, for *building good-will at your chair,* "DENTURE CLOSEUPS." This book, which is FREE, graphically explains the special difficulties of a V-Shaped Roof, of Spongy, Yielding Alveolar Tissues, Unbalanced Occlusion, a Knife-Edge Mandibular Ridge, etc. And it enables you to *show* patients, by means of convincing charts and illustrations, that it is just as necessary to re-adapt dentures to shrinking gums as to fit new lenses to changing eyes.

Over 50,000 DENTISTS have already requested copies of "DENTURE CLOSEUPS." Send for YOURS today. Simply mail your card, or letterhead, with the lower portion of this page to Clark-Cleveland, Inc., Binghamton, N. Y.

FASTEETH

Sends Patients to Your Office

★ Mercury SKY HIGH

BUT AKRATEX USERS JUST LAUGH AND LAUGH

Because they know that AKRATEX (for inlay dies) gives far better results than Amalgam and costs only 1/12th as much. AKRATEX never shrinks, has 1/5th the expansion variation of Amalgam. Easier and speedier, too—model ready for use in 25 min. Regular 5-oz. unit (shown below).....$2.25

LITERATURE ON REQUEST

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WHIP-MIX CORP.

Louisville, Ky.

COLUMBIA MODEL GLOSS

Gives a Smooth, Lustrous Finish to Stone or Plaster Models Makes Them Washable

Simple to Use: To 1 part Model Gloss add 1 part water and let models remain in this solution 30 minutes. Rinse models in water, dry and rub to desired gloss with soft cloth.

$1.00 a qt.

Columbia Rubber Model Formers

Price per set—
1 upper and 1 lower rubber model former
$2.75
Order through your Dealer

The easy way to make neat study models.

Just pour plaster into model former and mount anatomical cast.

Upper and lower models made in these formers occlude automatically.

Columbia Dentoform Corp.

Have you a copy of our 16-page illustrated price list?

131 East 23rd Street New York, N. Y.

PETRALIT *Advantages*

for

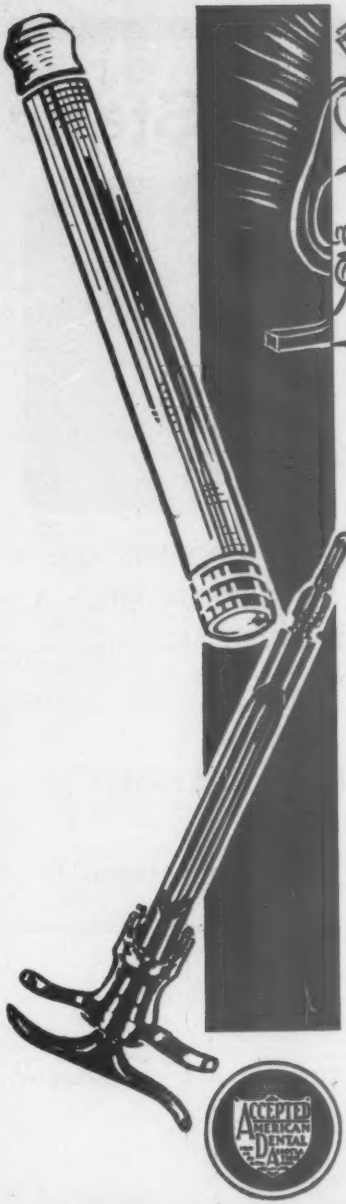
Posterior fillings and restorations. ● Fillings in cervical cavities. ● Lingual and proximal restorations in anteriors. ● Fillings in deciduous teeth. ● Cementing porcelain jacket crowns.

Petralit insulates the dental pulp against the possibility of irritating thermal changes—is perfectly adaptable to cavity walls, therefore extremely retentive—requires no cement base and only slight filling pressure—has a minute expansion before setting and in appearance is similar to tooth substance.

The actual crushing resistance of Petralit is many times greater than the masticatory stress and when used as directed, where indicated, nearly every restoration is successful and lasts as long as the retaining walls.

● Write for pamphlet—"Correct Technique in the use of PETRALIT."

PREMIER DENTAL PRODUCTS CO.
PHILADELPHIA, PA.



IT'S ALL IN THE MAKING

The uniform efficiency of PROCO - SOL LOCAL ANESTHETIC SOLUTIONS is not something that just happens by chance. . . . Every precaution is taken to make PROCO-SOL SOLUTIONS both sterile and uniform. The solutions are carefully tested before and after filling into glass cartridges.

The glass used for syringe cartridges, as well as the rubber stoppers are the finest, purest products available. They, too, are carefully sterilized.

Order a box from your local dealer today, be sure to specify "Proco-Sol" Procaine with Neo-Synephrin Hydrochloride; or with Epinephrin . . . Free Samples gladly sent upon request.

PROCO-SOL CHEMICAL COMPANY, INC.

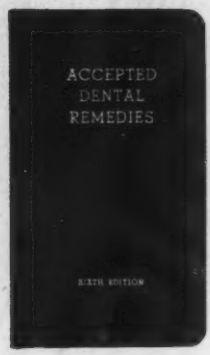
1233 SPRING GARDEN STREET, PHILADELPHIA, PA.

Widen the Beneficial Circle

Knowledge Is Not Static

What about

SULFANILAMIDE?
SULFAPYRIDINE?
VITAMIN K?
ANESTHETICS?
ANTISEPTICS?
FORMULAS?
ACCEPTED ARTICLES?



THE NEW A.D.R. CONTAINS MODERN INFORMATION
IT TAKES THE GUESSWORK OUT OF MATERIA MEDICA
IT HELPS YOU RENDER AN IMPROVED SERVICE
IT SAVES YOU MONEY

YOU SHOULD HAVE THE LATEST EDITION!

PUBLISHED BY A.D.A. AS A SERVICE TO THE PROFESSION.

AMERICAN DENTAL ASSOCIATION
212 East Superior Street
Chicago, Illinois

Enclosed please find one dollar ($1.00) for which send a copy of **Accepted Dental Remedies**, 6th Edition, to:

Name_____

Address_____

City and State_____

PREVIEW...on the first visit

1.
You order a small supply of Dr. Myerson's Characterized and "True-Blend" Anteriors mounted on the new Trial Mounts.

2.
You select the actual set of teeth required for the patient. It looks like a specimen case.

3.
Actually an acrylic-like holder, the teeth are adjustably positioned in a small strip of wax.

4.
The patient with the actual set of teeth to be used in her denture tried in the mouth on the first visit.

Made possible by

DR. MYERSON'S NEW INVENTION

for MOUNTING instead of carding

"Characterized" and "True-Blend"

PATENTED PATENTED

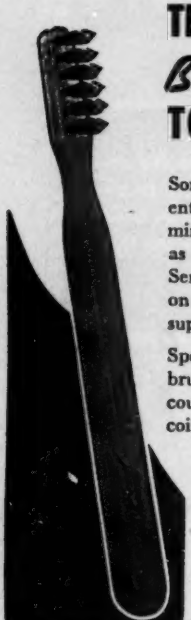
SUPERIOR IN FLUORESCENCE AND ALL OTHER QUALITIES

IDEAL TOOTH INCORPORATED CAMBRIDGE MASS.

★ ★

Give your patients a Christmas present they'll appreciate!

★ ★



THE DR. BUTLER *Black Bristle* TOOTH BRUSH

Something new and different—A gift that will remind them of you as long as the tooth brush lasts! Send early for quotations on your Christmas Gift supply.

Special price of 40¢ for 2 brushes (two only). Check coupon. Enclose stamps or coins.

Mail this coupon!

JOHN O. BUTLER CO. ADA-12-40
7359 Cottage Grove Ave., Chicago, Ill.

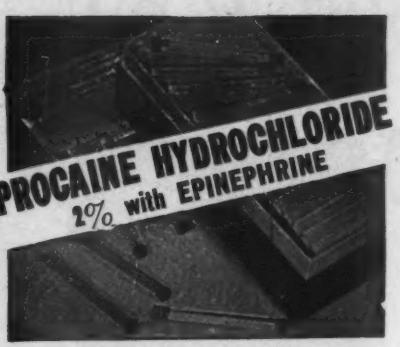
I enclose 40c for two brushes:

___Hard Black
___Extra-hard Black
___Hard Unbleached
___Extra-hard Unbleached
___Medium Bleached
___Hard Bleached
___Extra-hard Bleached
___Junior (Child's Brush)

Dr.....

Address.....

City & State.....



Dependable Aid in the Surgical Technique

For satisfactory surgical procedure, the action of the local anesthetic must be completely under the control of the operator.

The anesthetic balanced to *meet all* of your dental operative requirements is—

RORER
Procaine Hydrochloride

Here Are Some of Its Surgical Advantages

Prevents patient's anticipatory nervousness by simplifying preparation for injection. Cartridge plungers can be counted upon to slide freely, steadily, with little pressure.

Anesthetic action is rapid, and surgical delays are eliminated.

Duration of anesthesia is sufficiently prolonged for satisfactory completion of treatment.

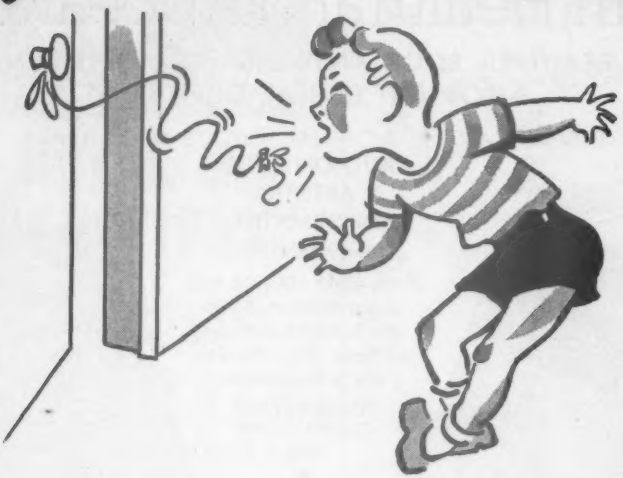
TO RECEIVE THIS RELIABLE AID

Get Ten-tube trial package of these superior quality Injection Cartridges Procain and Epinephrine, together with trial package of ten Neo-Synephrine 1.2500 anesthetic for *mild* vasoconstriction. Both sent you postpaid, for special introductory price of $1.00. Mail amount, with name and address, to

WILLIAM H. RORER, Inc.
Dental Division
254 South 4th Street
Philadelphia, Pa.
Dealer Inquiries Invited

RORER

Self service in Dentistry



MOST of us remember our own efforts at self-service in dentistry—an attempt to pull a loose tooth—or worse, a tight one, a temporary filling in a cavity, cold packs on an ulcerating tooth. They were pretty unsatisfactory. And just then—the services of a skilled and competent dentist were beyond price. Skilled dentistry is insurance against pain, disfigurement, ill-health that plagued our forefathers, and still plagues much of the world.

And although millions of Americans are still "afraid of the dentist," or do not understand the vital need for his services, most of us today prize his special skill and appreciate the wonders of modern dentistry, in which America leads the world.

And when the experienced dentist buys insurance, he does not just say, "$50 worth of protection please." He asks for and obtains the full service and advice of the experienced agent or broker, familiar with the special insurance problems of his clients. No worries about uncovered risks or lapsed policies.

Like the dentist, the insurance agent or broker is a middleman, rendering indispensable service in his own special field. And because we believe in the middleman's function and services, we refuse to accept business direct because it is not in the interests of the company or the assured to do so. When *you* buy National Surety Fidelity Bonds, Surety Bonds, Burglary or Forgery Insurance through your local agent or broker, you deal with a customer and friend who is a fellow member and supporter of the American Business System.

NATIONAL SURETY CORPORATION

VINCENT CULLEN, President

Journal Income Helps Build Better Dentistry

Teeth, Health and Appearance

THIS BEAUTIFUL BOOK ANSWERS MOST OF THE MORE IMPORTANT DENTAL QUESTIONS

INDISPENSABLE FOR OFFICE, SCHOOL AND LIBRARY

AUTHORITATIVE
ARTISTIC
INFORMATIVE
INEXPENSIVE

Forty-eight 10½x14 inch pages illustrated with one hundred and one pictures, fifty of which are in four colors.

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CLOTH COVER
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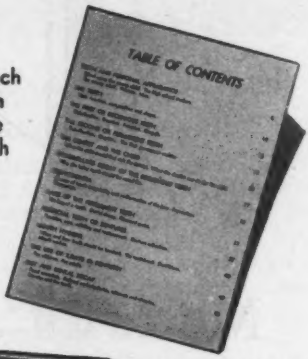

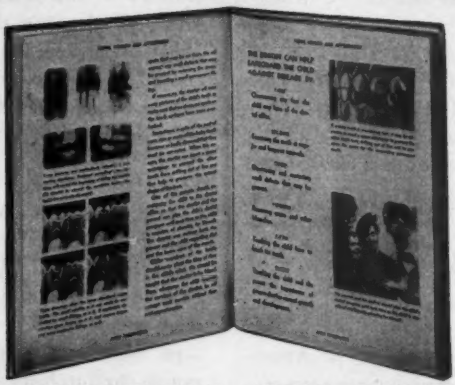

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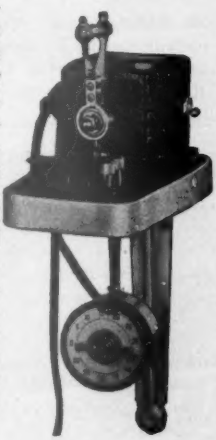

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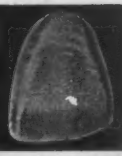

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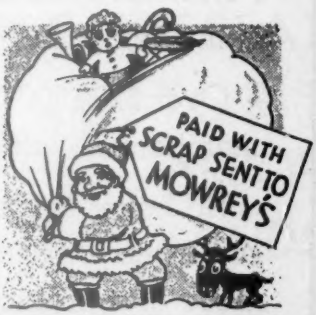

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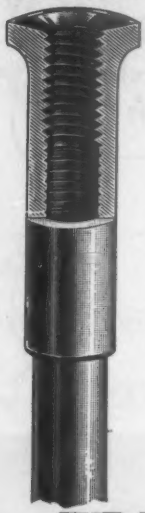

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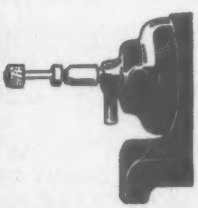

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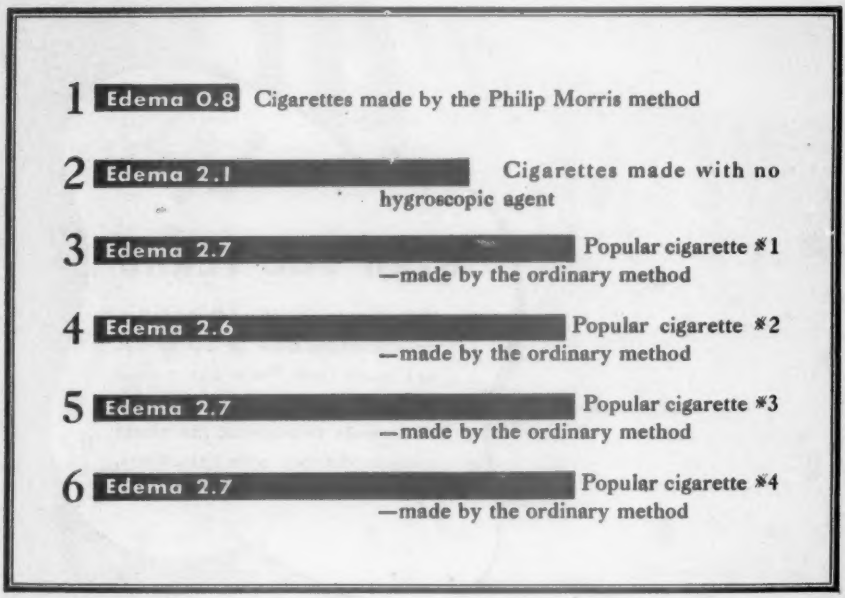
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INDEX TO ADVERTISEMENTS

December, 1940

Abbott Laboratories A-34
American Can Co. A-21
American Dental Association A-1, A-56
American Meat Institute A-29
Antidolor Mfg. Co., Inc. A-3
Austenal Laboratories, Inc. A-35

Baker & Co., Inc. A-6
Bureau of Public Relations A-36, A-40, A-48, A-58
Butler Co., John O. A-46

Clark-Cleveland, Inc. A-41
Classified Advertising A-50
College Directory A-52, A-53, A-54
Columbia Dentoform Corp. A-42
Columbus Dental Mfg. Co. A-22
Condit, P. N. A-51
Cook Laboratories, Inc. A-3
Corega Chemical Co. A-60
Council on Dental Therapeutics A-44
Crescent Dental Mfg. Co. A-49

Dee & Co., Thomas J. ..... Cover
Dentists' Supply Co. of N. Y. A-62
Du Pont de Nemours & Co., Inc., E. I. A-8, A-9

Florida Citrus Commission A-18

Garhart Dental Specialty Co. A-49
General Electric X-Ray Corp. A-25

Ideal Tooth Inc. A-45
Insurance Committee, A.D.A. A-31
International Nickel Co., Inc. A-20

Jelenko & Co., Inc., J. F. A-11
Johnson & Johnson A-2
Justi & Son, Inc., H. D. A-14

Kerr Dental Mfg. Co. A-16
King, Dr. Alfred T. A-51
Kolynos Co. A-26

Medical Protective Co. A-51
Merck & Co. Inc. A-10
Minimax Co. A-28
Mizzy, Inc. A-17
Mosby Co., C. V. A-27
Mowrey Co., W. E. A-55
Moyer Co., Inc., J. Bird A-57

National Surety Corp. A-47
Ney Co., J. M. ..... Cover
Novocol Chemical Mfg. Co. Inc. A-24

Pelton & Crane Co. A-51
Pepsodent Co. A-4
Philip Morris & Co., Ltd., Inc. A-59
Physicians Casualty & Health Ass'ns A-18
Premier Dental Products Co. A-42
Proco-Sol Chemical Co., Inc. A-43
Pycopé, Inc. A-19

Ransom & Randolph Co. A-30
Ritter Dental Mfg. Co., Inc. A-37
Rorer, Inc., William H. A-46
Rohm & Haas Co., Inc. A-32, A-33
Royal Metal Mfg. Co. A-57

Schneider Dental Laboratory, M. W. A-55
Southern California Dental School, University of A-55
Star Dental Mfg. Co., Inc. A-39

Ticonium A-15
Torit Mfg. Co. A-57

Universal Dental Co. A-7

Wernet Dental Mfg. Co. A-23
Whip-Mix Corp. A-42
White Dental Mfg. Co., S. S. A-12, A-13
Wisconsin Alumni Research Foundation .. A-38

Year Book Publishers, Inc. A-5

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